7/88

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

APPROVAL OF UNDERGROUND COAL MINING PERMIT APPLICATION/
APPLICATION TO REVISE A PERMIT

1. Name of Applicant The Ohio Valley Coal Company

2. Address of Applicant 56854 Pleasant Ridge Road

City Alledonia State Ohio Zip 43902

3. Application Number R-0360-2

4. Number of acres in underground workings 470.0

5. Number of surface acres to be affected -0-

6. The water monitoring plan for this permit shall be:

See monitoring plan in application.

Note: These monitoring requirements are separate from NPDES monitoring requirements.

7. This application is approved since it (demonstrates) and the Division (has) found that the criteria in paragraph (H) of rule 1501: 13-5-01 of the Administrative Code have been met.

Date Dec. 8, 1988 Signed

THE OHIO VALLEY COAL COMPANY

OPERA...

October 17, 1989

RECEIVED
OCT 18 1989
DIVISION OF RECLAMATION

Mr. Tim L. Dieringer, Chief
Division of Reclamation
Ohio Department of Natural Resources
Fountain Square
Columbus, Ohio 43224

Dear Mr. Dieringer:

As you are aware, we have applied for a revision (R-360-2) to our mining permit D-0360 for longwall mining. According to Policy/Procedure Directive Underground 89-2, we are required to perform pre-subsidence surveys of all structures 180 days prior to the anticipated date of subsidence.

However, we find we must request permission to conduct this survey with a modified time frame due to equipment availability problems. We are only able to purchase enough equipment for a 600 ft wide face when the original plan specified an 800 ft wide face. This change reduces the mining time per panel by 25 percent with a resulting shortfall in lead time for a pre-subsidence survey.

At this time, our plans are to conduct the surveys for the landowners in the first panel within the next two weeks, providing maximum lead time prior to subsidence. The resulting time frame will provide no less than four (4) months prior to the anticipated date of subsidence.

If you have any questions, please contact me. Your prompt consideration in this matter would be greatly appreciated.

APPROVED ☑
DISAPPROVED ☐
DATE: Dec 8, 1989
SIGNED Tim L. Dieringer Chief

Very truly yours,

THE OHIO VALLEY COAL COMPANY

David L. Bartsch

David L. Bartsch, P.E.
Project Engineer

DLB:jlr
Copies to: J. R. Forrelli
J. Hamilton
C. R. Kaluger
C. L. Luke
R. S. Rice
M. R. St. John

R-360-2

56854 PLEASANT RIDGE ROAD • ALLEDONIA OHIO 43902 • (614) 926-1351

OPERATOR

PROOF OF PUBLICATION

The State of Ohio
County of Belmont, ss:

The undersigned, being sworn, says that he or she is an employee of Eastern Ohio Newspapers, Inc., A Corporation, publisher of the Times Leader a newspaper published in Martins Ferry, Belmont County, Ohio, each day of the week except Saturday and of general circulation in said city and county; that it is a newspaper meeting the requirements of sections 7.12 and 5721.01 Ohio Revised Code as amended effective September 14, 1957; that affiant has custody of the records and files of said newspaper; and that the advertisement of which the annexed is a true copy, was published in said newspaper on each of the days in the month and year stated, as follows:

Sept 20 27 Oct
Nov 19 87
[redacted]

Subscribed by Affiant and sworn to before me, this 11 day of Nov, A.D. 19 87

[redacted]
Notary Public

DONNA JEAN LANDERS, Notary Public
State of Ohio
My Commission Expires February 6, 1990

Printer's Fees $ 50.00
Notary's Fees $ _____

THE TIMES LEADER
Martins Ferry, Ohio
Bellaire, Ohio

PUBLIC NOTICE

The Nacco Mining Company, 56854 Pleasant Ridge Road, Alledonia, Ohio 43902, has submitted application number P-[redacted] to renew a mining permit D-[redacted] to the Department of Natural R[redacted] reclamation. The [redacted] is located in [redacted] of Sections 19, [redacted] and Washington Township, parts of [redacted] 24, 30, and 36, of Belmont Co[redacted]. The area encompasses approximately 550 acres and is located on the Armstrongs Mills, 7½ minute U.S.G.S. quadrangle.

The application proposes to extend the five years plan to include additional coal removal using the longwall mining method. [redacted]

A copy of the application is [redacted] at the Belmont County Court House, Recorder's Office, 101 West Main Street, St. Clairsville, Ohio 43950, for public viewing. Written comments, or requests for additional conference, may be sent to the Division of Reclamation, Fountain Square, Building B-3, Columbus, Ohio 43224, within 30 days of the last date of this notice.

T-Adv. Sept. 20 - 4 Sun.

RECEIVED
NOV 27 1987
DIVISION OF
RECLAMATION

OCT 15 1987

RO 360-2

RO 360-2

TOVCC 20557

(5) If the applicant is a business entity other than a single proprietorship, provide the following for each officer, partner, director, or person performing a function similar to a director:

Name See Addendum No. 1, Position _____

Address _____ OPERATOR

City _____, State _____, Zip _____

Name _____, Position _____

Address _____

City _____, State _____ Zip _____

Name _____, Position _____

Address _____

City _____, State _____ Zip _____

Name _____, Position _____

Address _____

City _____, State _____ Zip _____

(6) If the applicant is a business entity other than a sole proprietorship, does any person own of record ten percent or more of any class of voting stock of the applicant? _____ Yes, _____No. If "yes", submit Attachment 1.

(7) If the applicant is a business entity other than a sole proprietorship, has the applicant, any partner, or principal shareholder previously operated a coal mining operation in the United States within the five year period preceding the date of this application under a name other than that in which this application is filed? _____ Yes, _____ No. If "yes", list the names below.

_____

_____

_____

RO 560-2

OPERATOR

ADDENDUM NO. 1

THE NACCO MINING COMPANY
ADDENDUM TO PART 1, Page 23(5)
POWHATAN NO. 6 MINE

LISTING OF OFFICERS

Fred H. Miller, President, Director
56854 Pleasant Ridge Road
Alledonia, Ohio 43902

Robert E. Murray, Vice President, Director
12800 Shaker Boulevard
Cleveland, Ohio 44120

Robert S. Hawekotte, Vice President and Treasurer, Director
12800 Shaker Boulevard
Cleveland, Ohio 44120

Herschell A. Cashion, Vice President - Sales
12800 Shaker Boulevard
Cleveland, Ohio 44120

George W. Bartlett, Jr., Vice President - Engineering
12800 Shaker Boulevard
Cleveland, Ohio 44120

Thomas A. Koza, Secretary, Director
12800 Shaker Boulevard
Cleveland, Ohio 44120

Daniel G. Mitchell, Assistant Secretary
12800 Shaker Boulevard
Cleveland, Ohio 44120

Howard J. Grindon, Assistant Treasurer
12800 Shaker Boulevard
Cleveland, Ohio 44120

John R. Cook, Director
12800 Shaker Boulevard
Cleveland, Ohio 44120

(8) Provide the following information for every legal or equitable owner of record, surface and mineral, of the property to be mined or affected by surface operations and facilities, indicating whether the ownership is of surface, coal, or non coal mineral.

** Name Richard D. & Patricia L. Moore

Address 59308 Armstrong-Centerville Road

City Jacobsburg, State Ohio Zip 43933

Surface X, Coal _____, Non Coal _____

*** Name Albert E. & Mary K. Ogilbee

Address 59844 Ogilbee Road

City Jacobsburg, State Ohio Zip 43933

Surface X, Coal _____, Non Coal _____

*** Name Wayne & Barbara Ogilbee

Address 59982 Ogilbee Road

City Jacobsburg, State Ohio Zip 43933

Surface X, Coal _____, Non Coal _____

*** Name The Ohio Valley Coal Company

Address 56854 Pleasant Ridge Road

City Alledonia, State Ohio Zip 43902

Surface X, Coal X, Non Coal _____

*** Name Graydon & Sharon Ooten

Address Route 1

City Jacobsburg, State Ohio Zip 43933

Surface X, Coal _____, Non Coal _____

* Inside Permit Area
** Outside Permit Area, Inside Hydrologic Boundary
*** Property in Each Area

(8) Provide the following information for every legal or equitable owner of record, surface and mineral, of the property to be mined or affected by surface operations and facilities, indicating whether the ownership is of surface, coal, or non coal mineral.

*** Name Paul Bobick, Et Al.

Address 59560 Armstrong-Centerville Road

City Jacobsburg, State Ohio Zip 43933

Surface X, Coal _____, Non Coal _____

* Name Daniel R. Caretti

Address 46100 Belmont-Centerville Road

City Belmont, State Ohio Zip 43718

Surface X, Coal _____, Non Coal _____

*** Name Delmas W. & Mary L. Caretti

Address 46100 Belmont-Centerville Road

City Jacobsburg, State Ohio Zip 43933

Surface X, Coal _____, Non Coal _____

* Name Neal Fankhauser

Address 59881 Armstrong-Centerville Road

City Jacobsburg, State Ohio Zip 43933

Surface X, Coal _____, Non Coal _____

** Name Eileen Glover

Address 46020 Liddle Road

City Jacobsburg, State Ohio Zip 43933

Surface X, Coal _____, Non Coal _____

* Inside Permit Area
** Outside Permit Area, Inside Hydrologic Boundary
*** Property in Each Area

(8) Provide the following information for every legal or equitable owner of record, surface and mineral, of the property to be mined or affected by surface operations and facilities, indicating whether the ownership is of surface, coal, or non coal mineral.

*** Name Joseph Gondira

Address 4390 Grand Avenue

City Shadyside, State Ohio Zip 43947

Surface X, Coal _____, Non Coal _____

** Name Harrison Leasing

Address 40580 Cadiz-Piedmont Road

City Cadiz, State Ohio Zip 43907

Surface X, Coal _____, Non Coal _____

*** Name Anthony & Joanna J. Kolenc

Address Route 2, Box 363

City Dillonvale, State Ohio Zip 43917

Surface X, Coal _____, Non Coal _____

** Name Robin B. Liddle

Address 59430 Armstrong-Centerville Road

City Jacobsburg, State Ohio Zip 43933

Surface X, Coal _____, Non Coal _____

*** Name Royce & Betty Liddle

Address 59430 Armstrong-Centerville Road

City Jacobsburg, State Ohio Zip 43933

Surface X, Coal _____, Non Coal _____

* Inside Permit Area
** Outside Permit Area, Inside Hydrologic Boundary
*** Property in Each Area

(8) Provide the following information for every legal or equitable owner of record, surface and mineral, of the property to be mined or affected by surface operations and facilities, indicating whether the ownership is of surface, coal, or non coal mineral.

*** Name Richard & Vernice Otto

Address 60263 Ogilbee Road

City Jacobsburg, State Ohio Zip 43933

Surface X, Coal _____, Non Coal _____

* Name H.R. & D.J. Perkins

Address 59788 Armstrong-Centerville Road

City Jacobsburg, State Ohio Zip 43933

Surface X, Coal _____, Non Coal _____

*** Name A. & D. Riley

Address 59645 Armstrong-Centerville Road

City Jacobsburg, State Ohio Zip 43933

Surface X, Coal _____, Non Coal _____

** Name Seaway Coal Co.

Address Box 247

City Cadiz, State Ohio Zip 43907

Surface X, Coal _____, Non Coal _____

Name _____

Address _____

City _____, State _____ Zip _____

Surface _____, Coal _____, Non Coal _____

* Inside Permit Area
** Outside Permit Area, Inside Hydrologic Boundary
*** Property in Each Area

(8) Provide the following information for every legal or equitable owner of record, surface and mineral, of the property to be mined or affected by surface operations and facilities, indicating whether the ownership is of surface, coal, or non coal mineral.

** Name Dexter and Marilyn Blaney

Address Box 8

City Bethesda, State Ohio Zip 43719

Surface X, Coal _____, Non Coal _____

** Name Robert Shepherd

Address 433 N. Main Street

City Bethesda, State Ohio Zip 43719

Surface X, Coal _____, Non Coal _____

** Name Donald R. Ward

Address Box 120 Green Acres

City Shadyside, State Ohio Zip 43947

Surface X, Coal _____, Non Coal _____

Name _____

Address _____

City _____, State _____ Zip _____

Surface _____, Coal _____, Non Coal _____

Name _____

Address _____

City _____, State _____ Zip _____

Surface _____, Coal _____, Non Coal _____

* Inside Permit Area
** Outside Permit Area, Inside Hydrologic Boundary
*** Property in Each Area

(10) Are there purchasers of record under a real estate contract of the property to be mined or affected by surface operations and facilities? ___ Yes, __X__ No. If "yes", submit Attachment 2.

(11) Is the operator identified in item A(2) or any owner, holder, or purchaser listed in items A (8), (9), or (10) respectively, a business entity other than a single proprietorship?
__X__ Yes, _____ No. If "Yes" submit Attachment 3.

(12) Is any part of the proposed permit area adjacent to any lands which are not owned by those persons identified in item A(8)?
____ Yes, ____ No. If "yes", submit Attachment 4.

(13) Has the applicant or any person listed in item A.(7) above been issued a coal mining permit in the United States subsequent to 1970?
__X__ Yes, ____ No. If "yes", submit Attachment 5.

(14) Does the applicant or any person listed in item A. (7) above have any coal mining permit applications pending in the United States?
____ Yes, ____ No. If "yes", submit Attachment 23.

(15) Name of mine __Powhatan No. 6_____.

(16) List below the MSHA identification numbers for the mine and for each facility on the proposed permit area.

33-01159 -- Powhatan No. 6 Mine

(17) Does the applicant hold lands, interests in lands, options, or pending bids on interests for lands which are contiguous to the proposed permit area? __X__ Yes, ____ No. If "yes", submit as an addendum to the permit application, a description of the lands.
See Addendum to Part 1, Page 6, A(17)

(18) Is it anticipated that individual mining permits will be sought for any of those lands described in item 17. above?
__X__ Yes, ____ No. If "yes", identify those lands to include the size, sequence, and timing of future mining permits.

See Map Entitled "Proposed Future Permit Sequencing"

(19) List below the person or persons primarily responsible for ensuring that the applicant will comply with Chapter 1513 of the Revised Code and the rules adopted pursuant thereto while mining and reclaiming the area for which this permit is requested.

(20) Submit Attachment 22, Certificate of Liability Insurance.
See Attachment 22

9-88

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 3
(IDENTIFICATION OF OTHER BUSINESS ENTITIES)

Applicant's Name The Ohio Valley Coal Company

This attachment is to be completed and submitted with the permit application if the response to item A.(11) in Part 1 of the permit application is "yes." A separate attachment is to be submitted for each business entity.

Name of business entity The Ohio Valley Coal Company

Statutory agent A & H Statutory

Address 1100 Huntington Building

City Cleveland State Ohio Zip 44115

Person's Name Robert E. Murray Position President and Chief Executive Officer

Address 56854 Pleasant Ridge Road

City Alledonia State Ohio Zip 43902

Person's Name _____ Position _____

Address _____

City _____ State _____ Zip _____

Person's Name _____ Position _____

Address _____

City _____ State _____ Zip _____

Person's Name _____ Position _____

Address _____

City _____ State _____ Zip _____

9-88

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 5
(PERMIT LISTING)

Applicant's Name The Ohio Valley Coal Company

This attachment is to be completed and submitted with the permit application if the response to item A.(13) in Part 1 of the permit application is "yes."

Indicate the business entity for which this listing has been completed The Ohio Valley Coal Company

License/Permit #	Name of Regulatory Agency	State
D-0360	ODNR	Ohio

9-88

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 22
(CERTIFICATE OF LIABILITY INSURANCE)

Name of Insured The Ohio Valley Coal Company

This is to certify that the policy of insurance listed below has been issued to the above named insured and is in force at this time. The policy provides bodily injury and property damage insurance for all coal mining and reclamation operations of the insured in the State of Ohio as required by paragraph (B) of rule 1501:13-7-07 of the Administrative Code stated below.

Name of Insurer See Certificate of Insurance Enclosed
Policy Number _____
Policy Period _____
Name of Underwriting Agent _____
Address of Underwriting Agent _____
Telephone No. of Underwriting Agent _____

In the event of cancellation or non-renewal of this policy, including non-payment of policy premiums, the insurer agrees to promptly notify: The Division of Reclamation, Fountain Square, Columbus, Ohio 43224.

October 13, 1989
Date

Signature of Underwriting Agent

This certificate is issued as a matter of information only and confers no rights upon the Division of Reclamation. This certificate does not amend, extend, or alter the coverage afforded by the policy listed above.

1501:13-7-07(B) THE PUBLIC LIABILITY INSURANCE POLICY SHALL:

(1) BE IN EFFECT DURING THE TERM OF THE PERMIT OR ANY RENEWAL, INCLUDING THE LENGTH OF ALL RECLAMATION OPERATIONS;

(2) PROVIDE FOR PERSONAL INJURY AND PROPERTY DAMAGE PROTECTION IN AMOUNTS NOT LESS THAN THE FOLLOWING:

(a) THREE HUNDRED THOUSAND DOLLARS FOR ALL DAMAGES BECAUSE OF BODILY INJURY SUSTAINED BY ONE PERSON AS THE RESULT OF ANY OCCURRENCE, AND FIVE HUNDRED THOUSAND DOLLARS FOR ALL DAMAGES BECAUSE OF BODILY INJURY SUSTAINED BY TWO OR MORE PERSONS AS THE RESULT OF ANY ONE OCCURRENCE; AND

(b) THREE HUNDRED THOUSAND DOLLARS FOR ALL CLAIMS ARISING OUT OF DAMAGE TO PROPERTY AS THE RESULT OF ANY ONE OCCURRENCE INCLUDING COMPLETED OPERATIONS, WITH AN AGGREGATE LIMIT OF FIVE HUNDRED THOUSAND DOLLARS FOR ALL PROPERTY DAMAGE TO WHICH THE POLICY APPLIES.

(3) INCLUDE A RIDER REQUIRING THAT THE INSURER NOTIFY THE CHIEF WHENEVER SUBSTANTIVE CHANGES ARE MADE IN THE POLICY, INCLUDING ANY TERMINATION OR FAILURE TO RECLAIM.

ACORD. CERTIFICATE OF INSURANCE

ISSUE DATE (MM/DD/YY) 5-24-89

PRODUCER

RESCHINI AGENCY, INC.
P.O. BOX 449
INDIANA, PA 15701
PHONE (412) 349-1300

CODE SUB-CODE

INSURED

Ohio Valley Resources, Inc. etal
56854 Pleasant Ridge Road
Alledonia, Ohio 43902

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

COMPANIES AFFORDING COVERAGE

COMPANY LETTER A: Federal Insurance Company
COMPANY LETTER B: AIG
COMPANY LETTER C: Fireman's Fund Insurance Company
COMPANY LETTER D:
COMPANY LETTER E:

COVERAGES

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	ALL LIMITS IN THOUSANDS	
	GENERAL LIABILITY				GENERAL AGGREGATE	$ 2,000
A	X COMMERCIAL GENERAL LIABILITY	(90)7317-08-88	5-25-89	5-25-90	PRODUCTS-COMP/OPS AGGREGATE	$ 1,000
	CLAIMS MADE X OCCUR.				PERSONAL & ADVERTISING INJURY	$ 1,000
	OWNER'S & CONTRACTOR'S PROT.				EACH OCCURRENCE	$ 1,000
					FIRE DAMAGE (Any one fire)	$
					MEDICAL EXPENSE (Any one person)	$
	AUTOMOBILE LIABILITY				COMBINED SINGLE LIMIT	$
	ANY AUTO				BODILY INJURY (Per person)	$
	ALL OWNED AUTOS				BODILY INJURY (Per accident)	$
	SCHEDULED AUTOS				PROPERTY DAMAGE	$
	HIRED AUTOS					
	NON-OWNED AUTOS					
	GARAGE LIABILITY					
	EXCESS LIABILITY				EACH OCCURRENCE	AGGREGATE
B	X	BE3074142	5-25-89	5-25-90	$5,000	$1,000
C	X OTHER THAN UMBRELLA FORM	XXX1902198	5-25-89	5-25-90	30,000	5,000
	WORKER'S COMPENSATION AND EMPLOYERS' LIABILITY				STATUTORY	
					$	(EACH ACCIDENT)
					$	(DISEASE—POLICY LIMIT
					$	(DISEASE—EACH EMPLO
	OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/RESTRICTIONS/SPECIAL ITEMS

Nacco Mining - Permit #360

CERTIFICATE HOLDER

Ohio Dept. of Natural Resources
Division of Reclamation
Fountain Square, Bldg. B3
Columbus, Ohio 43224
Att: Vic Nardy

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE TH
EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL
MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO TH
LEFT, BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION O
MAKE FOR SUCH KIND OR BY THE COMPANY, ITS AGENTS OR REPRESENTATIVES

AUTHORIZED REPRESENTATIVE

Reschini Agency, Inc.

ACORD 25-S (3/88) © ACORD CORPORATION 1

TOVCC 20569

ADDENDUM TO PART 1, PAGE 6, A(17)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

The lands adjacent to the proposed permit area may be described as the contiguous coal lands listed in Appendix III of D-0360 (Original Submittal), Addendum No. 2, which reads in part:

> The applicant holds interest in lands which are contiguous to the proposed permit area. These lands extend from Washington Township T-5-N, R-4-W, into Smith Township T-6-N, R-4-W.

C. RIGHT OF ENTRY INFORMATION

(1) Provide either of the following to allow for coal mining operations on the permit and adjacent area.

(a) A copy of the documents, or

(b) An affidavit wherein the documents are described. The affidavit is to be submitted as an addendum to the permit application and is to be in the following format: (Note - a separate affidavit is not required for each document.)

AFFIDAVIT

State of Ohio, _____ County, ss. _____ being first duly sworn, says that the following described documents conveys to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document _____

Execution Date _____

Expiration Date _____

Parties: From _____ To _____

Description of land: No. Acres _____

County _____, Township _____

Sections _____, Lots _____

Explanation of legal rights claimed _____

_____

Pending litigation _____Yes, _____No.

_____ _____

Signature of Affiant Date

_____

Position

Sworn to before me and subscribed in my presence this _____ day of _____ 19 ____.

_____

Notary Public

See Addendum to Part 1, Page 7, C(1)

ADDENDUM TO PART 1, PAGE 7, C(1)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

RIGHT OF ENTRY INFORMATION

Given the list of landowners indicated on Page 8, C(2), The Ohio Valley Coal Company has valid existing rights on each of the lots indicated. Pending in Belmont County Court of Common Pleas is Case No. 88-C10-136 which was filed by a number of landowners, most of which are not within the proposed permit area. The following lists plaintiffs who hold deeds in the permit and adjacent areas and are considered to be in litigation:

*1. Robin B. Liddle; Section 25; Smith Township; Tract 80.

2. Royce and Betty Liddle; Section 19; Smith Township; Tracts 42 and 44.

*3. Richard D. and Patricia L. Moore; Section 19; Smith Township; Tract 42.

4. Delmas W. and Mary L. Caretti; Section 19 and 20; Smith Township; Tracts 46, 47-4, 47-1, and 48-4.

5. Daniel R. Caretti; Section 19; Smith Township; Tract 47-4.

6. Anthony and Joanna J. Kolenc; Section 25; Smith Township; Tracts 82 and 83.

7. Eileen Glover; Section 19; Smith Township; Tract 43.

8. Albert E. and Mary K. Ogilbee; Sections 19 and 25; Smith Township; Tracts 51-2, 52-2, 51-1, 52-1, and 86.

9. Joseph J. Gondira; Section 25; Smith Township; Tract 82.

10. Wayne and Barbara Ogilbee; Section 25; Smith Township; Tract 51-1.

11. Richard and Vernice Otto; Sections 19, 20, 26; Smith Township; Tract 47-4.

* Indicates that this property is located within the hydrologic boundary but entirely outside of the permit boundary.

The specific rights for each tract of land may be found by referring to original permit D-0360. The tracts for each landowner may be determined from Part 1, Page 8, C(2) and from the enclosed parcel map which was reproduced from Appendix III of D-0360.

STATE OF OHIO
NOTARY PUBLIC
CLAUDE LOUIS LUKE
My Commission Expires Aug. 20, 1991

David L. Bartsch, P.E.

MY COMMISSION EXPIRES AUG. 20, 1991

C. RIGHT OF ENTRY INFORMATION

(1) Provide either of the following to allow for coal mining operations on the permit and adjacent area.

(a) A copy of the documents, or

(b) An affidavit wherein the documents are described. The affidavit is to be submitted as an addendum to the permit application and is to be in the following format: (Note - a separate affidavit is not required for each document.)

AFFIDAVIT

State of Ohio, Belmont County, ss. David L. Bartsch being first duly sworn, says that the following described documents conveys to the applicant the legal right explained below and is a subject of litigation as shown below.

Type of document Warranty Deed

Execution Date 7 November 1989

Expiration Date ------

Parties: From Nancy E. Sechrest To The Ohio Valley Coal Company

Description of land: No. Acres 133.577

County Belmont, Township Smith

Sections 26, Lots _____

Explanation of legal rights claimed Ownership of land and all coal seams, including the No. 8

Pending litigation _____ Yes, X No.

David L. Bartsch 11-8-89

Signature of Affiant Date

Project Engineer

Position

Sworn to before me and subscribed in my presence this 9th day of NOVEMBER 19 89.

STATE OF OHIO
NOTARY PUBLIC
CLAUDE LOUIS LUKE
My Commission Expires Aug. 20, 1991

Claude Louis Luke

Notary Public

(2) List below the following information for each surface owner of land within the proposed permit and adjacent area.

	Owner Name	County	Township	Section	**Lot	T-	R-
	Bobick, Paul et al	Belmont	Smith	19	10	6	4
	Caretti, Daniel R.	Belmont	Smith	19	47-4	6	4
	Caretti, Delmas W. & Mary L.	Belmont	Smith	19	46,47-4	6	4
	Fankhauser, Neal	Belmont	Smith	19	47-4	6	4
*	Glover, Eileen	Belmont	Smith	19	43	6	4
	Liddle, Royce & Betty	Belmont	Smith	19	44,42	6	4
*	Moore, Richard D. & Patricia L.	Belmont	Smith	19	42	6	4
	Ogilbee, Albert E. & Mary K.	Belmont	Smith	19	51-2, 52-2	6	4
*	The Ohio Valley Coal Company	Belmont	Smith	19	41	6	4
	Ooten, Graydon & Sharon	Belmont	Smith	19	47-4	6	4
	Otto, Richard & Vernice	Belmont	Smith	19	47-4	6	4
	Perkins, H.R. & D.J.	Belmont	Smith	19	46	6	4
	Riley, A. & D.	Belmont	Smith	19	46	6	4

* Outside permit, but inside hydrologic boundary
** Coal Tract

(2) List below the following information for each surface owner of land within the proposed permit and adjacent area.

	Owner Name	County	Township	Section	**Lot	T-	R-
*	Blaney, Dexter & Marilyn	Belmont	Smith	25	79	6	4
	Gondira, Joseph	Belmont	Smith	25	82	6	4
	Kolenc, Anthony & Joanna J.	Belmont	Smith	25	83,82	6	4
*	Liddle, Robin B.	Belmont	Smith	25	80	6	4
	Ogilbee, Albert E. & Mary K.	Belmont	Smith	25	51-1, 52-1,86	6	4
	Ogilbee, Wayne & Barbara	Belmont	Smith	25	51-1	6	4
*	Seaway Coal Co.	Belmont	Smith	25	87,88, 84	6	4
	The Ohio Valley Coal Co.	Belmont	Smith	25	86	6	4
*	Shepherd, Robert	Belmont	Smith	25	82	6	4
*	Ward, Donald R.	Belmont	Smith	25	81	6	4
*	Harrison Leasing	Belmont	Smith	26	90	6	4
*	The Ohio Valley Coal Company	Belmont	Smith	26	47-6	6	4
*	Otto, Richard & Vernice	Belmont	Smith	26	47-5, 47-6	6	4
*	The Ohio Valley Coal Co.	Belmont	Smith	26	89,47-6	6	4

* Outside permit, but inside hydrologic boundary
** Coal Tract

(2) List below the following information for each surface owner of land within the proposed permit and adjacent area.

	Owner Name	County	Township	Section	**Lot	T-	R-
*	Caretti, Delmas W. & Mary L.	Belmont	Smith	20	47-1, 47-4 & 48-4	6	4
*	Harrison Leasing	Belmont	Smith	20	47-4 & 48-4	6	4
*	Ooten, Graydon & Sharon	Belmont	Smith	20	47-1	6	4
*	Otto, Richard & Vernice	Belmont	Smith	20	47-1	6	4

* Outside permit, but inside hydrologic boundary

** Coal Tract

(9) Will operations in either the permit or adjacent areas conducted under this permit affect land within one hundred feet of a cemetary? ____Yes, __X__No. If "Yes" submit proof of valid existing right.

(10) Are there areas within the proposed permit or adjacent areas designated unsuitable for coal mining operations under rule 1501:13-3-07 of the Administrative Code or under study for designation in an administrative proceeding under this rule? _____Yes, __X__No.

(a) If "Yes" to Item (11) above, did the applicant make substantial legal and financial commitments in the proposed permit and adjacent areas prior to January 4, 1977? _____Yes, _____No.

(b) If "Yes to Item (11)(a) above, submit as an addendum to the permit application information supporting the assertions that the commitments were made prior to January, 4, 1977.

E. PERMIT TERM AND RELATED INFORMATION

(1) Anticipated/actual date for:

(a) Starting mining operations 1990
(b) Terminating mining operations 2010

(2) Number of surface acres to be Affected:

(a) First year of operation _____
(b) During life of permit _____

(3) Horizontal extent over life of permit 470 acres; vertical extent 200-600 feet.
Total acreage - full recovery

(4) In the space below, provide the name and address of the public office where a complete copy of this permit application is to be filed.

Belmont County Court House
Recorder's Office
101 West Main Street
St. Clairsville, Ohio 43950

PART 2 ENVIRONMENTAL RESOURCES INFORMATION

A. CULTURAL, HISTORIC, AND ARCHEOLOGICAL INFORMATION

(1) Are there any cultural or historic resources listed or eligible for listing on the National Register of Historic Places within the proposed permit and adjacent area? ____ Yes, __X__ No. If "yes", describe the resources including the location.

(2) Are there any known archeological features within the proposed permit and adjacent areas? _____ Yes, __X__ No. If "yes", describe the feature including the location.

B. GEOLOGY DESCRIPTION

(1) For underground mining operations, describe the geology down to and including the first aquifer to be affected below the lowest coal seam to be mined. In addition submit Attachment 13 as required by paragraph (C)(1) of rule 1501:13-4-13 of the Administrative Code.

NOTE: Provide at least three (3) Attachment 13's or one (1) per one hundred and sixty (160) acres, whichever is greatest. At least one test hole or data from a shaft or highwall must be located within the affected area to complete section one of Attachment 13.

Section 2 of Attachment 13 must be completed for at least three (3) holes, (one of which may be the same as that used for section 1) or one (1) per one hundred and sixty (160) acres, whichever is greatest.

C. GROUND WATER INFORMATION

(1) Describe the ground water hydrology for the proposed permit and adjacent areas and underground workings. The description is to include the information required by paragraph (D)(1) of rule 1501:13-4-13 of the Administrative Code.

ADDENDUM TO PART 2, PAGE 12, A
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

SUBMITTAL OF ATTACHMENT 27A

According to PPD Underground 89-3, OVCC will complete the Attachment 27A for all structures fifty (50) years of age or older simultaneously with the completion of the pre-subsidence survey. The completed 27A shall be forwarded to the Division at least 180 days prior to subsidence at a specific structure. If the Ohio Historic Preservation Office, after a review of the Attachment 27A, deems that specific structures are listed or eligible for listing on the "National Register of Historic Places" (National Register), and if the Chief of the Division of Reclamation requires, OVCC will either avoid the structure or plans will be submitted describing appropriate mitigation and treatment measures to protect the structure. The measures will be completed before the properties are affected by any mining operation.

2/89

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION
Planned Subsidence Areas - Underground Mining Operations

ATTACHMENT 27A
(HISTORIC AND PREHISTORIC PROPERTIES)

1. Applicant's Name The Ohio Valley Coal Company Permit # D-0360

   Address 56854 Pleasant Ridge Road

   City Alledonia State Ohio Zip 43902

2. Contact Person David L. Bartsch Phone 614-926-1351

3. Location and Acreage Information

   County Belmont Township Smith

   Section(s)/Lots 19, 25 T- 6 , R- 4

   USGS Quadrangle Armstrong Mills Acreage 470

4. Full Coal Recovery Area Map Attached: (USGS Quadrangle with full coal recovery area delineated)

5. Historic and Prehistoric Structures:

   Definitions

   A historic or prehistoric structure is a work made up on interdependent and interrelated parts in a definite pattern of organization. Constructed by humans, and 50 years or older, it is usually an engineering project.

   Types

   Historic structures include, but are not limited to dwellings, buildings, barns, farmstead outbuildings, bridges, culverts, churches, schools, halls, iron furnaces (and associated buildings), canals, forts, abandoned coal mine buildings, mine entrances, tipples and related structures, etc.

   Prehistoric structures include, but are not limited to, earthworks and mounds.

List all known historic and prehistoric structures below and locate each one on the map to be sent to the SHPO including corresponding labeled black and white, front and rear photographs of each structure. Attach addendum, if necessary.

Structure Type	Construction Date	Map Reference	Photo# Front	Photo# Rear
Wood Frame House	Early 1900's	1		
Wood Frame House	Early 1900's	2		
Modified Brick House	Late 1800's	3		
Brick and Frame House	1830's	4		
Wood Frame House	Late 1800's	5		

6. Previous Historic and/or Archeological Surveys: (describe any surveys known to applicant on the planned subsidence areas)

7. SHPO please send this form to:

Dr. Jeffrey C. Reichwein
Division of Reclamation
Fountain Square, Building B-3
Columbus, Ohio 43224

FOR USE BY THE STATE HISTORIC PRESERVATION OFFICE ONLY

(check appropriate spaces)

A. _____ This is a recommendation for an archeological survey of the proposed full coal recovery area based on the following reasons (attached addendum, if necessary):

List all known historic and prehistoric structures below and locate each one on the map to be sent to the SHPO including corresponding labeled black and white, front and rear photographs of each structure. Attach addendum, if necessary.

Structure Type	Construction Date	Map Reference	Photo# Front	Photo# Rear
Wood Frame House	Late 1800's	6		

6. Previous Historic and/or Archeological Surveys: (describe any surveys known to applicant on the planned subsidence areas)

7. SHPO please send this form to:

Dr. Jeffrey C. Reichwein
Division of Reclamation
Fountain Square, Building B-3
Columbus, Ohio 43224

FOR USE BY THE STATE HISTORIC PRESERVATION OFFICE ONLY

(check appropriate spaces)

A. _____ This is a recommendation for an archeological survey of the proposed full coal recovery area based on the following reasons (attached addendum, if necessary):

A SHPO review of the area shown on the map has provided a listing below of all known historic and prehistoric properties listed and eligible for listing on the "National Register of Historic Places" and known historic and prehistoric sites on the permit and adjacent areas (in a 1.5 mile radius). The listing includes, when appropriate, those historic and prehistoric structures identified by the applicant in items 5. and 6. above.

Listed and Eligible National Register Sites

Site Name	(#)	Type	Proposed Area	Adjacent Area

Known Historic and Prehistoric Sites

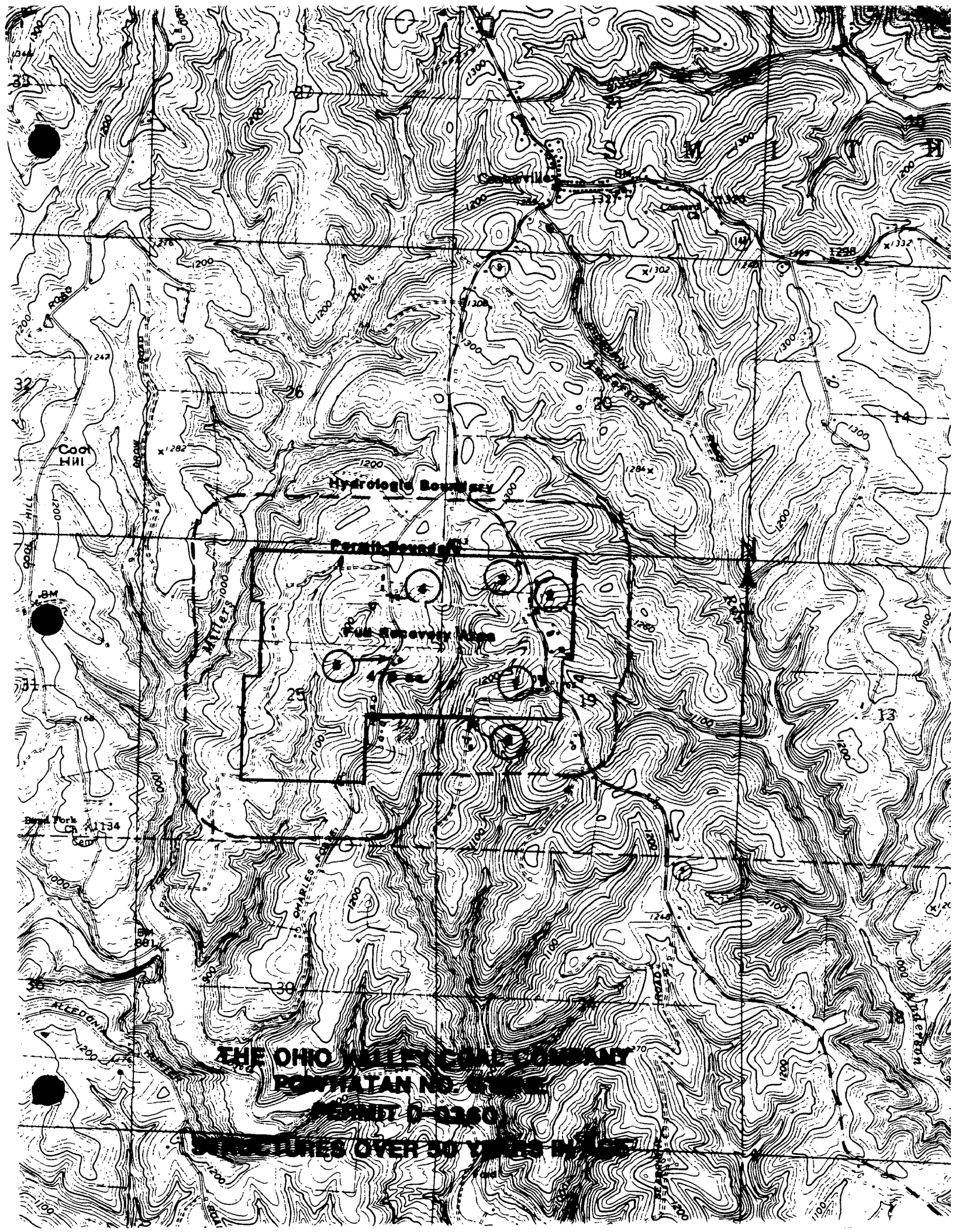
Site Name	(#)	Type	Proposed Area	Adjacent Area

B. _____ A SHPO review of the area shown on the application map and information contained in this attachment finds that the proposed mining does not have a reasonable probability of affecting any properties listed or eligible for listing on the "National Register of Historic Places." Therefore, no further coordination will be necessary with this office unless the scope of the proposed application area changes.

State Historic Preservation Officer _____

SHPO # _____

Date _____


Hydrologic Boundary
Permit Boundary
Full Recovery Area
Cool Hill
Millers
Charles Fork
Boyd Fork Ch
Allegheny
Anderson
THE OHIO
POWHATAN NO.
PERMIT O-
STRUCTURES OVER 50 YEARS

ADDENDUM TO PART 2, PAGE 12, B(1)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

TEST HOLES

Because test hole Y-1 was drilled several years ago, it cannot be determined at what elevation water was encountered. However, core hole logs for both N89-1 and N89-2 show saturated zones.

ATTACHMENT NO. 13

ADDENDUM TO PART 2(B)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

Part 2. Environmental Resources Information

B. Geology Description

Stratigraphy of the proposed permit area is formed by the Monongahela formation of the Pennsylvania period, and the Dunkard group of Permian time. The primary strata of both sections consists of an alternating sequence of limestone, sandstone, siltstone, shale, claystone, and coal.

The Monongahela formation is approximately 245 feet thick. In ascending order, it occupies the interval from the Pittsburgh No. 8 to the Waynesburg No. 11 Coalbed. Approximately 50 to 70 percent of this formation is made up of limestone.

The Dunkard group is 250 to 300 feet thick, occupying the interval from the Waynesburg No. 11 Coalbed to the surface. Primary rock units here include shale, siltstone, and sandstone. Limestone forms about 10 percent of the maximum total thickness.

Structurally, the Pittsburgh No. 8 Coalbed rises west to northwest at grades under one percent.

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Mine)

Applicant The Ohio Valley Coal Company

SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. N89-2

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil	35'					
Subsoil						
Shale	177'				V	M
Shale	42'				V	M
Coal	1'	X			M	M
Shale	96'				V	M
Coal	2'	X			M	M
Shale	1'				V	M
Shale	41'				V	M
Shale	9'				V	M
Shale	9'				V	M
Limestone	45'			X	S	S
Shale	3'				V	M
Limestone	47'			X	S	S
Coal	4'	X			M	M

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum very, moderately, or slightly compactible or erodible.

V - Very
M - Moderately
S - Slightly

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Mine)

Applicant The Ohio Valley Coal Company

SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. N89-2

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Shale	7'				V	M
Limestone	5'			X	S	S
Shale	7'				V	M
Limestone	5'			X	S	S
Shale	5'				V	M
Limestone	6'			X	S	S
Shale	4'				V	M
Limestone	18'			X	S	S
Shale	4'				V	M
Limestone	18'			X	S	S
Clay	3.5'				V	V
Coal	.9'	X			M	M
Clay	1'				V	V

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum a very, moderately, or slightly compactible or erodible.

V - Very
M - Moderately
S - Slightly

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Mine)

Applicant The Ohio Valley Coal Company

SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. N89-2

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Coal	5.6'	X			M	M
Shale	.4'				V	M
Shale	2.5'				V	M
Clay	1.8'				V	V
Shale	2.8'				V	M
Clay	.3'				V	V

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at th face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum very, moderately, or slightly compactible or erodible.

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THE OHIO VALLEY COAL COMPANY

DRILL LOG

Core Hole: N89-2 Surface Elevation: 1308'

Location: Perkins Farm

Date: November 2, 1989

Driller: L. Nelson

From	To	Type of Formation
0	35	Top and Clays (Water 32') (6 GPM)
35	212	Sandy Shale and Shale (Water 120') (6 GPM)
212	254	Shale and Limestone Bands
254	255	Trace of Coal (1 to 2")
255	351	Lime Shale and Red Shale
351	353	Coal (#11 Coal)
353	354	Clay Shale
354	395	Sandy Shale
395	404	Clay Shale
404	413	Shale
413	458	Lime Rock
458	461	Green Shale
461	508	Lime Rock and Shale Bands
508	512	Coal (48") (#9 Coal)
512	519	Lime Shale
519	524	Limestone
524	531	Shale
531	536	Limestone
536	541	Shale
541	547	Limestone
547	551	Lime Shale
551	569	Limestone
569	573	Shale
573	591	Limestone
591.0	591.3	Broken Formation - Cutting Debris from Hole (4")
591.3	594.8	Claystone - Mudstone (42")
594.9	595.8	Roof Coal (11.5")
595.8	596.8	Claystone - Mudstone (11.8")
596.8	602.4	Coal (#8) (67.3")
602.4	602.8	Dark Gray Shale (5.5")
602.8	605.3	Limey Shale (29.5")
605.3	607.1	Fireclay (22.0")
607.1	609.9	Sandy Shale (33.0")
609.9	610.2	Fireclay (4.0")

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Mine)

Applicant The Ohio Valley Coal Company

SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. Y-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil	24' 3"					
Subsoil						
Sandstone	2' 5"				S	S
Shale	1' 5"				V	M
Sandstone	4' 6"				S	S
Clay	3' 1"				V	V
Clay	0' 5"				V	V
Clay	0' 5"				V	V
Siltstone	3' 11"				M	M
Sandstone	3' 10"				S	S
Shale	6' 5"				V	M
Clay	1' 5"				V	V
Clay	2' 5"				V	V
Clay	7' 10"				V	V
Clay	3' 7"				V	V

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum a very, moderately, or slightly compactible or erodible.

V - Very
M - Moderately
S - Slightly

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Mine)

Applicant The Ohio Valley Coal Company

SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. Y-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Shale	3' 2"				V	M
Clay	2' 1"				V	V
Shale	0' 4"				V	M
Clay	0' 11"				V	V
Shale	5' 5"				V	M
Clay	0' 4"				V	V
Clay	1' 2"				V	V
Shale	1' 3"				V	M
Clay	3' 7"				V	V
Shale	0' 3"				V	M
Shale	2' 9"				V	M
Clay	1' 8"				V	V
Clay	0' 4"				V	V

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum as very, moderately, or slightly compactible or erodible.

V - Very
M - Moderately
S - Slightly

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Mine)

Applicant The Ohio Valley Coal Company

SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. Y-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Clay	1' 0"				V	V
Clay	0' 7"				V	V
Sandstone	2' 2"				S	S
Shale	4' 7"				V	M
Sandstone	2' 3"				S	S
Shale	2' 0"				V	M
Shale	1' 9"				V	M
Clay	0' 2"				V	V
Coal	1' 9"	X			S	S
Clay	0' 6"				V	V
Sandstone	0' 9"				S	S
Sandstone	1' 2"				S	S
Shale	2' 8"				V	M

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum a very, moderately, or slightly compactible or erodible.

V - Very
M - Moderately
S - Slightly

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Mine)

Applicant The Ohio Valley Coal Company

SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. Y-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Shale	3' 10"				V	M
Shale	0' 6"				V	M
Clay	4' 4"				V	V
Clay	3' 7"				V	V
Shale	8' 2"				V	M
Sandstone	1' 2"				S	S
Shale	4' 10"				V	M
Shale	0' 4"				V	M
Shale	1' 5"				V	M
Clay	5' 10"				V	V
Shale	3' 3"				V	M
Limestone	1' 3"			X	S	S
Shale	0' 7"				V	M

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum a very, moderately, or slightly compactible or erodible.

V - Very
M - Moderately
S - Slightly

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Mine)

Applicant The Ohio Valley Coal Company

SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. Y-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Shale	2' 4"				V	M
Shale	1' 3"				V	M
Clay	1' 4"				V	V
Clay	1' 1"				V	V
Shale	1' 3"				V	M
Limestone	1' 8"			X	S	S
Clay	0' 5"				V	V
Clay	4' 5"				V	V
Limestone	1' 5"			X	S	S
Limestone	0' 11"			X	S	S
Limestone	1' 3"			X	S	S
Limestone	6' 3"			X	S	S
Clay	0' 2"				V	V

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum very, moderately, or slightly compactible or erodible.

V - Very
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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Mine)

Applicant The Ohio Valley Coal Company

SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. Y-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Clay	0' 2"				V	V
Clay	0' 3"				V	V
Clay	0' 2"				V	V
Limestone	1' 9"			X	S	S
Shale	1' 0"				V	M
Limestone	1' 1"			X	S	S
Shale	1' 0"				V	M
Clay	8' 4"				V	V
Limestone	4' 5"			X	S	S
Clay	4' 5"				V	V
Limestone	4' 0"			X	S	S
Clay	1' 10"				V	V
Limestone	8' 2"			X	S	S

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum a very, moderately, or slightly compactible or erodible.

V - Very
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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Mine)

Applicant The Ohio Valley Coal Company

SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. Y-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Shale	0' 10"				V	M
Limestone	4' 3"			X	S	S
Shale	0' 5"				V	M
Limestone	1' 8"			X	S	S
Shale	0' 8"				V	M
Limestone	1' 8"			X	S	S
Clay	1' 6"				V	V
Shale	1' 0"				V	M
Limestone	1' 10"			X	S	S
Limestone	1' 8"			X	S	S
Limestone	1' 2"			X	S	S
Limestone	3' 5"			X	S	S
Shale	1' 4"				V	M

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum a very, moderately, or slightly compactible or erodible.

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Mine)

Applicant The Ohio Valley Coal Company

SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. Y-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Limestone	1' 10"			X	S	S
Shale	1' 1"				V	M
Shale	4' 4"				V	M
Clay	0' 8"				V	V
Clay	1' 9"				V	V
Limestone	3' 10"			X	S	S
Shale	2' 9"				V	M
Shale	1' 1"				V	M
Clay	1' 3-3/4"				V	V
Shale	0' 4"				V	M
Coal	3' 10½"	X			S	S
Siltstone	0' 3-3/4"				M	M
Siltstone	1' 1"				M	M

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum a very, moderately, or slightly compactible or erodible.

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Mine)

Applicant The Ohio Valley Coal Company

SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. Y-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Shale	1' 10"				V	M
Limestone	3' 7"			X	S	S
Clay	1' 9"				V	V
Limestone	1' 10"			X	S	S
Shale	4' 3"				V	M
Shale	2' 1"				V	M
Limestone	0' 3"			X	S	S
Shale	1' 3"				V	M
Limestone	5' 3"			X	S	S
Clay	1' 4"				V	V
Clay	0' 3"				V	V
Shale	0' 11"				V	M
Limestone	7' 2"			X	S	S

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at th face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum very, moderately, or slightly compactible or erodible.

V - Very
M - Moderately
S - Slightly

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Mine)

Applicant The Ohio Valley Coal Company

SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. Y-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Limestone	0' 7"			X	S	S
Limestone	5' 1"			X	S	S
Clay	1' 7"				V	V
Limestone	3' 7"			X	S	S
Clay	0' 8"				V	V
Limestone	4' 4"			X	S	S
Clay	1' 1"				V	V
Clay	2' 2"				V	V
Limestone	1' 9"			X	S	S
Limestone	3' 0"			X	S	S
Clay	1' 10"				V	V
Clay	1' 2"				V	V
Clay	0' 5"				V	V

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum very, moderately, or slightly compactible or erodible.

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Sampling Site No. Y-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Clay	0' 8"				V	V
Clay	0' 4"				V	V
Clay	0' 4"				V	V
Sandstone	0' 4"				S	S
Shale	0' 8"				V	M
Shale	1' 0"				V	M
Limestone	11' 10"			X	S	S
Clay	1' 3"				V	V
Clay	1' 3"				V	V
Clay	0' 9"				V	V
Limestone	0' 11"			X	S	S
Limestone	1' 5"			X	S	S
Limestone	0' 9"			X	S	S

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum very, moderately, or slightly compactible or erodible.

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SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. Y-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Limestone	1' 8"			X	S	S
Shale	0' 6"				V	M
Clay	0' 2"				V	V
Shale	0' 3½"				V	M
Coal	1' 1½"	X			S	S
Shale	0' 4"				V	M
Clay	0' 6½"				V	V
Coal	5' 2¼"	X			S	S
Clay	3' 1"				V	V
Clay	0' 4"				V	V
Clay	1' 8"				V	V
Clay	1' 1"				V	V

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum as very, moderately, or slightly compactible or erodible.

V - Very
M - Moderately
S - Slightly

CORE HOLE Y-1 D. D. H. No. 1 SURFACE ELEVATION 1100 FT

Description of Strata	Thickness Feet	Thickness Inches	Total Depth Feet	Total Depth Inches
Surface				
Shaley Sandstone	24	3	24	3
Gray Shale	2	5	26	8
Shaley Sandstone	1	5	28	1
Gray- Olive Green Clay	4	6	32	7
Red Clay	3	1	35	8
Soft Gray Clay	0	5	36	1
Gray Siltstone	0	5	36	6
Argillaceous Micaceous Sandstone	3	11	40	5
Gray Green Silty Shale	3	10	44	3
Black Carbonaceous Clay & Gray Clay Interbedded	6	5	50	8
Dark Gray Clay	1	5	52	1
Gray Calcareous Clay	2	5	54	6
Green Shaley Clay	7	10	62	4
Gray Silty Shale	3	7	65	11
Gray Calcareous Clay	3	2	69	1
Gray Silty Shale	2	1	71	2
Gray Calcareous Clay	0	4	71	6
Gray Silty Shale	0	11	72	5
Black Clay	5	5	77	10
Gray Clay	0	4	78	2
Silty Clayey Shale	1	2	79	4
Gray Calcareous Shaley Clay	1	3	80	6
Black Clayey Shale	3	7	84	2
Gray Green Clayey Shale	0	3	84	5
Gray Calcareous Clay	2	9	87	2
Dark Gray Clay	1	8	88	10
Gray Green Clay	0	4	89	2
Green Clay	1	0	90	2
Shaley Sandstone	0	7	90	9
Gray Clayey Shale	2	2	92	11
Shaley Sandstone	4	7	97	6
Silty Gray Shale	2	3	99	9
Gray Shale	2	0	101	9
Soft Gray plastic Clay	1	9	103	6
Coal with Shaley Bands NO. 11 COAL	0	2	103	8
Silty Clay	1	9	105	5
Gray Sandstone	0	6	105	11
Shaley Sandstone	0	9	106	8
Gray Silty Shale	1	2	107	10
Black Shale	2	8	110	6
Black Coaly Shale	3	10	114	4
Gray Non-Plastic Clay	0	6	114	10
Light Gray Plastic Clay	4	4	119	2
Silty Gray Shale	3	7	122	9
Shaley Sandstone	8	2	130	11
Gray Silty Shale	1	2	132	1
Black Shale	4	10	136	11
Dark Gray Silty Shale	0	4	137	3
Gray Shale with Black Clay Nodules	1	5	138	8
Gray Silty Shale	5	10	144	6
Dark Gray Argillaceous Limestone	3	3	147	9
Calcareous Silty Shale	1	3	149	0
Gray Shale	0	7	149	7
Dark Gray Clayey Shale	2	4	151	11
Dark Gray Calcareous Clay	1	3	153	2
Light Green Plastic Clay	1	4	154	6
Clayey Silty Calcareous Shale	1	1	155	7

[illegible] Green Plastic Clay	1	4	154	6
Clayey Silty Calcareous Shale	1	1	155	7
Argillaceous Limestone	1	3	156	10
Black & Dark Gray & Green Clay Interbedded	1	8	158	6
Gray Green Calcareous Clay	0	5	158	11
Limestone	4	5	163	4
Dark Argillaceous Limestone	1	5	164	9
Limestone	0	11	165	8
Dark Argillaceous Limestone	1	3	166	11
	6	3	173	8

D. D. H. No. 1

Description of Strata	Thickness Feet	Thickness Inches	Total Depth Feet	Total Depth Inches
Green Clay	0	2	173	4
Gray Clay	0	2	173	6
Black Clay	0	3	173	9
Green Clay	0	2	173	11
Limestone	1	9	175	8
Gray Green Shale	1	0	176	8
Limestone	1	1	177	9
Calcareous Shale	1	0	178	9
Green Calcareous Clay	8	4	187	1
Argillaceous Limestone	4	5	191	6
Green Calcareous Clay	4	5	196	11
Argillaceous Limestone	4	0	199	11
Green Calcareous Clay	1	10	201	9
Argillaceous Limestone	8	2	209	11
Dark Calcareous Shale	0	10	210	9
Limestone	4	3	215	0
Dark Gray Calcareous Shale	0	5	215	5
Limestone	1	8	217	1
Gray Calcareous Shale	0	8	217	9
Green Gray Argillaceous Limestone	1	8	219	5
Green Clay	1	6	220	11
Dark Gray Clayey Shale	1	0	221	11
Limestone	1	10	223	9
Argillaceous Silty Limestone	1	8	225	5
Limestone	1	2	226	7
Argillaceous Limestone	3	5	230	0
Green Shale	1	4	231	4
Argillaceous Limestone	1	10	233	2
Dark Green Calcareous Shale	1	1	234	3
Dark Gray Calcareous Shale	4	4	238	7
Black Shaley Clay	0	8	239	3
Gray Calcareous Clay	1	9	241	0
Dark Gray Argillaceous Limestone	3	10	244	10
Dark Calcareous Shale	2	9	247	7
Gray Green Calcareous Clayey Shale	1	1	248	8
Dark Gray Clay	1	3 3/4	249	11 3/4
Black Carbonaceous Shale	0	4	250	3 3/4
Pyritic Shaley Coal NO. 9 COAL	3	10 1/2	254	2 1/4
Black Carbonaceous Siltstone	0	3 3/4	254	6
Dark Gray Argillaceous Siltstone	1	1	255	7
Dark Gray Clayey Shale	1	10	257	5
Dark Gray Argillaceous Limestone	3	7	261	0
Gray Green Calcareous Shaley Clay	1	9	262	9
Argillaceous Limestone	1	10	264	7
Gray Green Calcareous Silty Shale	4	3	268	10
Dark Green Calcareous Silty Shale	2	1	270	11
Argillaceous Limestone	0	3	271	2
Dark Green Calcareous Silty Shale	0	3	272	5
Argillaceous Limestone	5	3	277	8
Green Clay	1	4	279	0
Dark Gray Clay	0	3	279	3
Black Carbonaceous Clayey Shale	0	11	280	2
Argillaceous Limestone	7	2	287	4
Black & Gray Argillaceous Limestone Interbedded	0	7	287	11
Argillaceous Limestone	5	1	293	0
Gray Green Calcareous Clay	1	7	294	7
Limestone	3	7	298	2
Green Calcareous Clay	0	8	298	10
Limestone				

Green Calcareous Clay	3	7	298	2
Limestone	0	8	298	10
Green Calcareous Clay	4	4	303	2
Green Clay	1	1	304	3
Argillaceous Limestone	2	2	306	5
Limestone	1	9	308	2
Green Calcareous Clay	3	0	311	2
Gray Calcareous Clay	1	10	313	0
Dark Gray Clay	1	2	314	2
Olive Green Calcareous Pyritic Clay	0	5	314	7
Black Carbonaceous Clay	0	8	315	3
Gray Clay	0	4	315	7
Dark Gray Argillaceous Sandstone	0	4	315	11
Black Carbonaceous Pyritic Clayey Shale	0	4	316	3
	0	8	316	11

D. D. H. No. 1

Description of Strata	Thickness Feet	Thickness Inches	Total Depth Feet	Total Depth Inches
Dark Gray Calcareous Clayey Shale	1	0	317	11
Argillaceous Limestone with Dark Gray Streaks	11	10	329	9
Dark Gray Calcareous Shaley Clay	1	3	331	0
Gray Green Calcareous Clay	1	3	332	3
Soft Green Clay	0	9	333	0
Argillaceous Limestone	0	11	333	11
Green Gray Argillaceous Limestone	1	5	335	4
Argillaceous Limestone	0	9	336	1
Olive Green Calcareous Clay with Limestone Nodules	1	8	337	9
Dark Gray Calcareous Clayey Shale	0	6	338	3
Dark Gray Shaley Calcareous Clay	0	2	338	5
Black Carbonaceous Shale	0	3 1/4	338	8 1/4
Pyritic Shaley Coal	1	1 1/4	339	9 1/2
Black Carbonaceous Shale	0	4	340	1 1/2
Gray Shaley Clay	0	6 1/4	340	7 3/4
Coal NO. 8 COAL	5	2 1/4	345	10
Dark Gray Calcareous Clay	3	1	348	11
Gray Clay	0	4	349	3
Dark Gray Calcareous Clay with Limestone Nodules	1	8	350	11
Dark Gray Calcareous Clay with Limestone Nodules, Not recovered	1	1	352	0

Coal Seam

Coal----------1'--5 3/8"
Fusain----------0'--0 1/16"
Coal----------0'--3 1/4"
Fusain----------0'--0 1/8"
Coal----------0'--3 3/4"
Black Carbonaceous Shale-0'--0 5/8"
Coal----------0'--4 5/16"
Shaley Coal----------0'--0 3/4"
Coal----------0'--10 5/8"
Black Carbonaceous Clay-0'--0 1/2"
Coal----------0'--0 7/8"
Black Carbonaceous Clay-0'--0 1/4"
Coal----------1'--4"
Pyritic Shaley Coal--0'--3 3/4"

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 13
(GEOLOGY REPORT - Underground Mine)

Applicant The Ohio Valley Coal Company

SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. N89-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Shale	30'				V	M
Clay	3'				V	V
Shale	5'				V	M
Slate	2'				M	S
Shale	18'				V	M
Sandstone	7'				S	S
Shale	34'				V	M
Shale	3'				V	M
Shale	19'				V	M
Shale	10'				V	M
Shale	35'				V	M
Limestone	5'			X	S	S
Shale	33'				V	M

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum a very, moderately, or slightly compactible or erodible.

V - Very
M - Moderately
S - Slightly

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(GEOLOGY REPORT - Underground Mine)

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SECTION 1 - AREAS TO BE AFFECTED BY SURFACE DISTURBANCE

Sampling Site No. N89-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Coal	1'	X			M	M
Shale	29'				V	M
Shale	17'				V	M
Sandstone	13'				S	S
Shale	7'				V	M
Shale	8'				V	M
Shale	22'				V	M
Sandstone	12'				S	S
Coal	1½'	X			M	M
Shale	41½'				V	M
Coal	3'	X			M	M
Shale	7'				V	M
Sandstone	36'				S	S

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum a very, moderately, or slightly compactible or erodible.

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Sampling Site No. N89-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Limestone	66'				S	S
Shale	5'				V	M
Coal	3½'	X			M	M
Shale	4½'				V	M
Shale	3'				V	M
Limestone	34'				S	S
Shale	2'				V	M
Limestone	5'				S	S
Coal	5'	X			M	M
Limestone	2'				S	S
Shale	2'				V	M
Limestone	5'				S	S
Shale	2'				V	M

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

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(GEOLOGY REPORT - Underground Mine)

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Sampling Site No. N89-1

Lithologic(1) Unit	Thickness	Acid (2) Producing	Toxic (2) Forming	Alkaline(2) Producing	Compactible(3)	Erodible(3)
Topsoil						
Subsoil						
Limestone	4'				S	S
Shale	1'				V	M
Shale	1.7'				V	M
Clay	3.3'				V	V
Coal	.8'	X			M	M
Clay	1'				V	V
Coal	5.2'	X			M	M
Shale	3.5'				V	M
Clay	1'				V	V
Shale	2'				V	M
Clay	1.1'				V	V

(1) Identify the stratum with an asterisk (*) if subsurface water will be exposed at the face up area.

(2) Identify with a (X) mark whether the stratum is acid producing, toxic forming, or alkaline producing.

(3) Using Texture and visual characteristics of the overburden, categorize the stratum a very, moderately, or slightly compactible or erodible.

V - Very
M - Moderately
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THE OHIO VALLEY COAL COMPANY

DRILL LOG

Core Hole: N89-1 Surface Elevation: 1273'

Location: Bobick Farm

Date: October 27, 1989

Driller: L. Nelson

From	To	Type of Formation
0	30	Clay Shale
30	33	Clay (Damp 1 GPM)
33	38	Shale
38	40	Slate
40	58	Sandy Shale
58	65	Sandstone
65	99	Sandy Shale
99	102	Red and Gray Shale
102	121	Sandy Shale
121	131	Red and Gray Shale
131	166	Sandy Shale
166	171	Limestone
171	204	Shale and Limestone Bands
204	205	Trace of Coal (6") (water 1½ GPM)
205	234	Shale
234	251	Sandy Shale
251	264	Sandstone
264	271	Sandy Shale
271	279	Red and Gray Shale
279	301	Sandy Shale
301	313	Sandstone
313	314½	Coal (18" #11)
314½	356	Sandy Shale
356	359	Coal (#10)
359	366	Clay Shale
366	402	Sandstone
402	468	Lime Rock and Shale Bands
468	473	Shale
473	476½	Coal (41" #9)
476½	480	Slaty Shale
480	493	Shale and Lime Rock Bands
473	527	Limestone
527	529	Shale
529	534	Limestone
534	539	Trace of Coal and Shale
539	541	Limestone
541	543	Shale
543	548	Limestone

THE OHIO VALLEY COAL COMPANY

DRILL LOG

From	To	Type of Formation
548	550	Shale
550	554	Limestone
554	555	Shale
555.0	556.7	Limey Shale (20")
556.7	560.0	Mudstone Claystone (39.5")
560.0	560.8	Coal (10")
560.8	561.8	Mudstone Claystone (11.5")
561.8	567.0	#8 Coal (63")
567.0	570.5	Dark Gray Limey Shale (42.5")
570.5	571.5	Fire Clay (11")
571.5	573.5	Sandy Shale (25")
573.5	574.6	Fire Clay (12.5")

ADDENDUM NO 2

THE NACCO MINING COMPANY
ADDENDUM TO PART 2, ITEMs C(1)
POWHATAN NO. 6 MINE

GROUNDWATER INFORMATION

Naturally occurring groundwater in this area resides primarily in consolidated (rock) aquifers that are partially or wholly confined and lie within the geologic interval above the Pittsburgh No. 8 Coal.

The rock aquifers are primarily sandstones, limestones and coals, but may also include shales and siltstones. All units transmit water primarily by secondary permeability or hydraulic conductivity (joints and other fractures, bedding partings). In general, primary permeabilities are low to very low for these materials. These aquifers are recharged through infiltration and percolation at outcrop zones and in some cases, by vertical flows through discontinuities and locally permeable overlying strata. The stratigraphy identified in Attachment No. 13, Geology Description, shows numerous lithologic units that are probably capable of transmitting water. However, confining pressures tend to keep lower strata rock discontinuities closed or "tight" so that useful aquifers tend to lie close to the ground surface. Wells penetrating near surface rock aquifers typically exhibit yields of less than one half gallon per minute.

Numerous aquicludes comprised of claystones, mudstones, underclays, limestones with clay lenses, and some shales and siltstones are interbedded with the more permeable water bearing units. These less permeable strata strongly influence horizontal and vertical water movement. A portion of the springs flowing

from valley walls below the ridgelines probably derive from rock aquifers and many can probably be identified as adjacent to the less permeable strata.

Groundwater quality data obtained from the rock aquifer springs and the wells generally indicate pH ranges from 7.25 to 8.37, alkalinities in excess of acidities, high hardness, and low metals concentrations.

Wells and springs located on the permit area are identified on the Attachment 14 forms included with this application.

THE OHIO VALLEY COAL COMPANY

October 9, 1989

Ohio Department of Natural Resources
Division of Water
Fountain Square
Columbus, Ohio 43224

Dear Sirs:

Enclosed is a map depicting an area of Smith Township, Belmont County, Ohio, that is planned to be mined using longwall mining techniques. Please provide us with a ground water inventory report for this area. The map is a part of the USGS 7½ minute Armstrong Mills Quadrangle.

As this is an essential part of our permitting for the longwall, your prompt consideration in this matter would be greatly appreciated. If you have any questions, please contact me.

Very truly yours,

THE OHIO VALLEY COAL COMPANY

David L. Bartsch

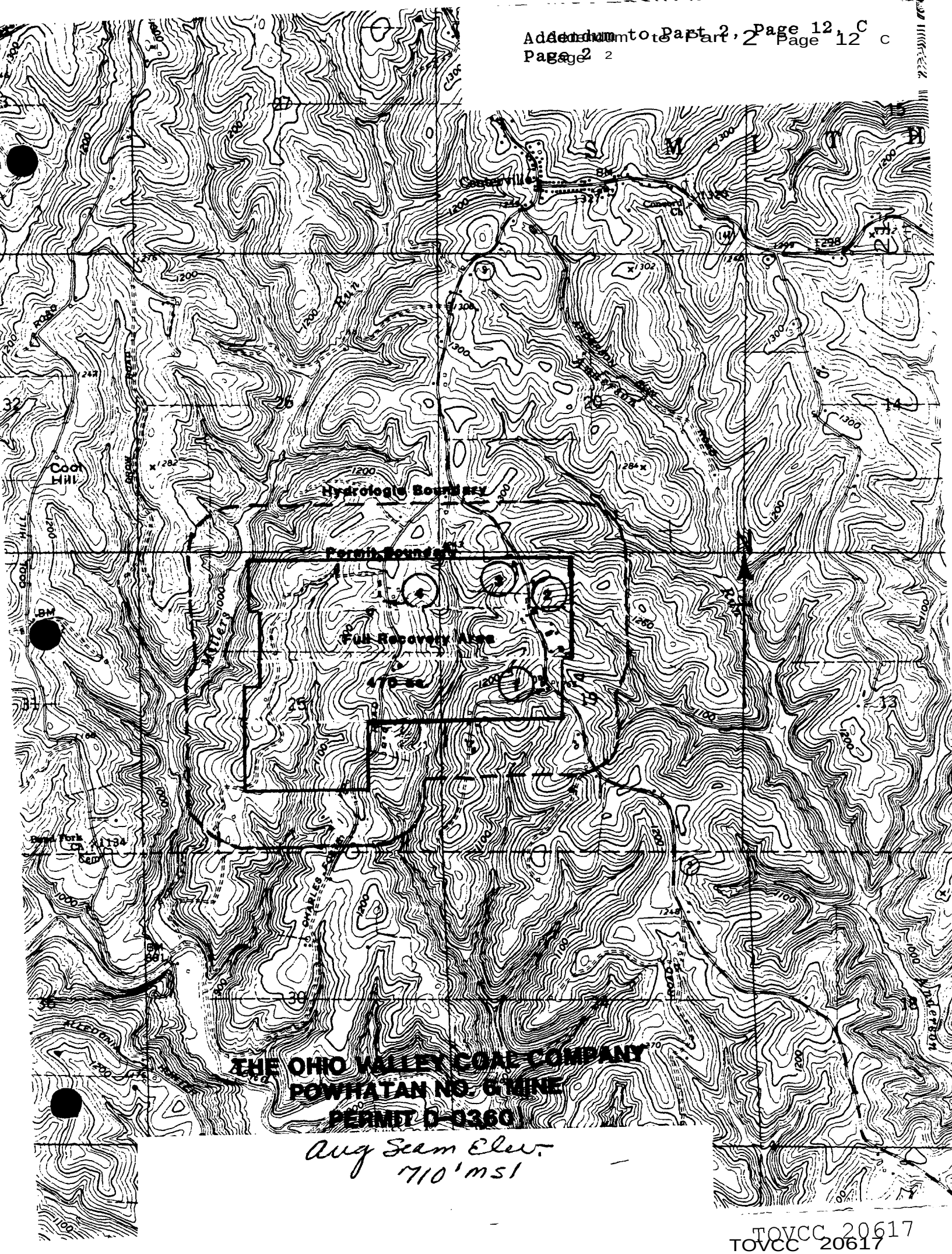
David L. Bartsch, P.E.
Project Engineer

DLB:jlr

Enclosure

Copies to: J. R. Forrelli
File

56854 PLEASANT RIDGE ROAD • ALLEDONIA OHIO 43902 • (614) 926-1351


Hydrologic Boundary
Permit Boundary
Full Recovery Area
470 ac
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT O-0360
Avg Seam Elev.
710' msl

TOVCC 20617

WELL LOG AND DRILLING REPORT

Page 3 ORIGINAL

Addendum to Part 2, Page 12, C

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1500 Dublin Road
Columbus, Ohio

No. 185234

County BELMONT Township SMITH Section of Township 20

Owner LLOYD McGAUGHEY Address ARMSTRONG MILLS O

Location of property 2 M. S. ON RT 9 FROM INT OF SR 9 AND SR 147

CONSTRUCTION DETAILS

Casing diameter 8" Length of casing 17'

Type of screen Length of screen

Type of pump MYERS ETECTO

Capacity of pump

Depth of pump setting 80

Date of completion JUNE 10 1957

BAILING OR PUMPING TEST

Pumping rate 10 G.P.M. Duration of test hrs.

Drawdown ft. Date

Developed capacity

Static level—depth to water 45 ft.

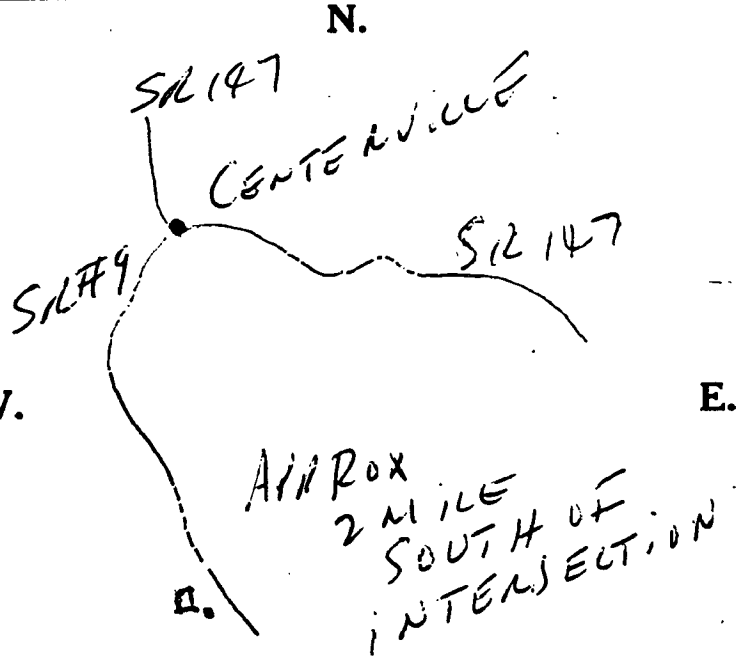
Pump installed by Phillips Drilling Co

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
	0 Feet	60 Ft.
OLD WELL		
SANDSTONE	60	65
SLATE	65	68
WATER — SANDSTONE	68	71
SLATE	71	80
SHALE	80	91

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm Phillips Drilling Co Date JUNE 11 1957

Address JACOBSBORG, O Signed Robert M. Phillips

TOVCC 20618

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1500 Dublin Road
Columbus, Ohio

No. 185203

County BELMONT Township SMITH Section of Township

Owner E. S. McCANN Address ARMSTRONGS MILLS, O

Location of property 3 MI SOUTH OF CENTERVILLE ON ST RT 9

CONSTRUCTION DETAILS

Casing diameter 6 1/4 Length of casing 22
Type of screen Length of screen
Type of pump DEEPWELL SET AND HAND PUMP
Capacity of pump
Depth of pump setting 54'
Date of completion

BAILING OR PUMPING TEST

Pumping rate 5 G.P.M. Duration of test hrs.
Drawdown ft. Date
Developed capacity
Static level—depth to water 25 ft.
Pump installed by PHILLIPS DRILLING CO

WELL LOG

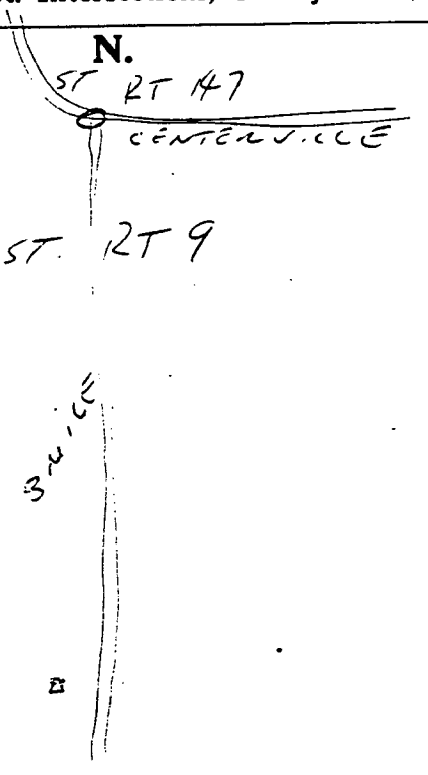
Formations Sandstone, shale, limestone, gravel and clay	From	To
CLAY	0 Feet	22 Ft.
SAND STONE	22	28
SHALE	28	35
SAND STONE	35	41
SHALE	41	48
LIME	48	51
SLATE	51	55
SHALE	55	62

WATER AT 25' AND 45'

6 1/4" CASING CEMENTED IN 8 1/4" HOLE

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm PHILLIPS DRILLING CO Date JULY 26 1956
Address JACOBSBURG O Signed Robert M. Phillips

81

WELL LOG AND DRILLING REPORT

Page 5
Addendum to Part 2, Page 12, C

NO CARBON PAPER NECESSARY– SELF-TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Fountain Square
Columbus, Ohio 43224

591102

COUNTY BELMONT TOWNSHIP SMITH SECTION OF TOWNSHIP

OWNER ALLAN A. PACK ADDRESS TRIDELPHIA W.V.A. ROUTE 2

LOCATION OF PROPERTY 3 MILES FROM ARMSTRONGS ON ST. RD #9

CONSTRUCTION DETAILS

Casing diameter 9" Length of casing 281

Type of screen _____ Length of screen _____

Type of pump _____

Capacity of pump _____

Depth of pump setting _____

Date of completion 9-19-81

BAILING OR PUMPING TEST
(specify one by circling)

Test rate 1 gpm Duration of test _____ hrs

Drawdown _____ ft Date _____

Static level (depth to water) _____ ft

Quality (clear) cloudy, taste, odor) _____

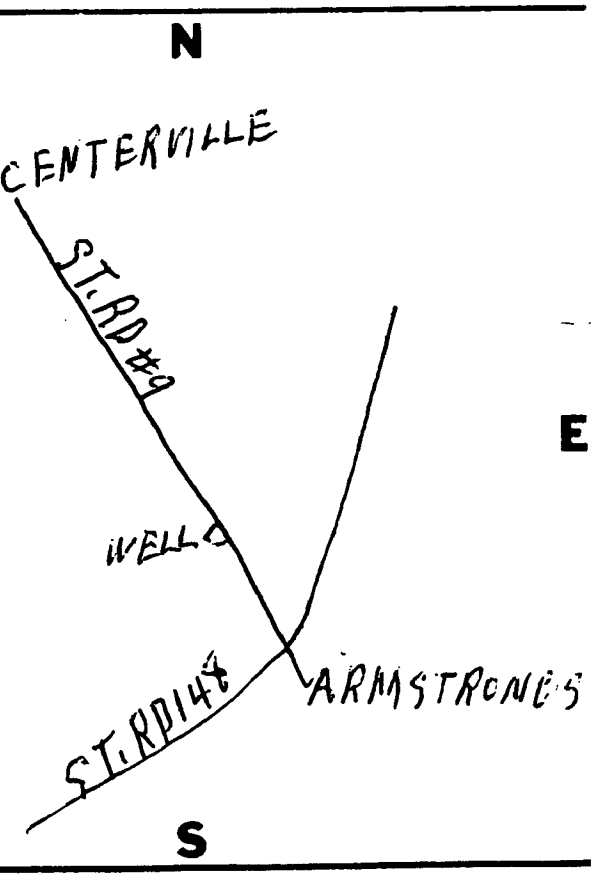
Pump installed by _____

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
SHALE SANDY	0 ft	10 ft
SAND STONE	10	12
SHALE	12	25
SAND STONE	25	27
SHALE	27	38
SAND STONE	38	41
GREY SHALE	41	58
RED SHALE	58	65
GREY SHALE	65	90
WATER AT 50'		

SKETCH SHOWING LOCATION

Locate in reference to numbered state highways, street intersections, county roads, etc.



DRILLING FIRM KRIECHBAUM

ADDRESS JACOBSBURG OHIO

DATE 9-21-81

SIGNED Jayne Kriechbaum

*If additional space is needed to complete well log, use next consecutive numbered form.

ORIGINAL COPY - ODNR, DIVISION OF WATER, FOUNTAIN SQ., COLS., OHIO 43224

TOVCC 20620

ODNR
OHIO DEPARTMENT OF
NATURAL RESOURCES
Division of Water
Fountain Sq., Bldg. E-
Columbus, OH 43224

Date October 10, 1989

ANALYSIS OF EXISTING GROUND WATER FILE DATA

Prepared by: Douglas Barber DB, hydrogeologist

Operator: Ohio Valley Coal Company Permit No. ___

County: Belmont

Township: Smith

Section(s): 19, 20, 25, 26

Number of water well logs within 1,000 foot radius of site (copies attached) 3: Field located 3

General description of local hydrology:
(Use additional sheet if necessary)

Ground water in this area is developed from bedrock, which consists of alternating units of sandstone, shale, limestone, clay, and coal. Ground water yields in this area range from 1 to 10 gpm, with safe long-term yields below 10 gpm. Recorded well depths range from 61'-91'.

Areas of particular concern:
(Use additional sheet if necessary)

Mining the coal seam at MSL elevation of 710', may cause the dewatering of nearby water wells. Monitoring of water levels in near-by wells should be conducted before, during, and after mining.

HYDROLOGIC MEASUREMENTS
AND ANALYSIS

THE FOLLOWING DATA IS TAKEN FROM:

WATER RESOURCES DATA FOR OHIO, 1985
WATER RESOURCES DATA FOR OHIO, 1978

PUBLISHED BY

THE UNITED STATES GEOLOGICAL SURVEY

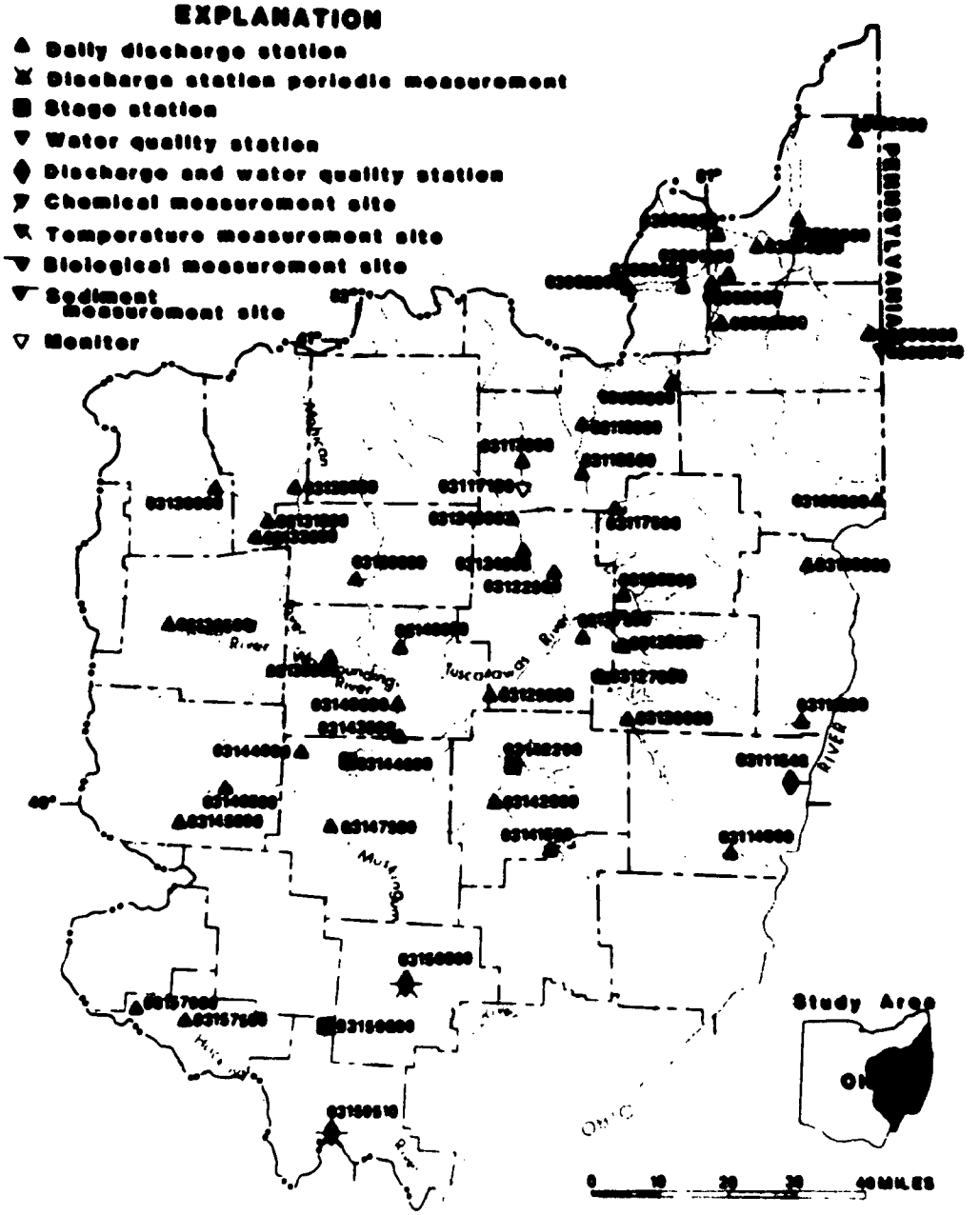


Figure 3b.--Location of data-collection stations excluding crest-stage and low-flow partial record sites and wells

03114000 CAPTINA CREEK AT ARMSTRONG MILLS, MO

LOCATION.—Lat 36°54'11", long 93°56'27", in NE 1/4 sec. 10, T.25 N., R.4 W., Barry County, Hydrologic Unit 08070202, on left bank at downstream side of bridge on State Highway 148, 0.8 mi east of Armstrong Mills, and 0.7 mi downstream from Anderson Ben.

DRAINAGE AREA.—134 mi².

PERIOD OF RECORD.—August 1926 to September 1934, October 1956 to current year.

REVISED RECORDS.—WSP 1937: Drainage area.

GAGE.—Water-stage recorder. Datum of gage is 730.53 ft above National Geodetic Vertical Datum of 1929. Aug. 20, 1926 to Sept. 30, 1934, nonrecording gage at same site, at datum 1.0 ft higher.

REMARKS.—Estimated daily discharges: Dec. 6-8 and Jan. 10 to Feb. 21. Records good except for periods of estimated record, which are fair. Water-quality data collected at this site 1965 to 1977. Sediment data collected 1969 to 1974.

AVERAGE DISCHARGE.—36 years, 163 ft³/s, 16.52 in/yr.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 21,000 ft³/s Aug. 11, 1960, gage height, 17.60 ft; no flow at times during 1929-30, 1932, 1934, 1960, 1963-66, 1973-74.

EXTREMES FOR CURRENT YEAR.—Peak discharges greater than base discharge of 3,000 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Feb. 22	1700	*3,110	*6.62				

Minimum discharge, 0.12 ft³/s Sept. 21, 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1964 TO SEPTEMBER 1965
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.8	20	93	200	60	174	631	41	12	3.8	1.5	6.3
2	15	23	77	187	60	152	388	201	12	3.4	1.1	3.9
3	18	30	69	158	58	128	261	422	187	6.4	1.6	2.8
4	6.7	37	90	135	58	117	269	163	148	18	1.6	1.6
5	4.7	188	68	134	58	186	248	112	67	7.4	1.4	1.5
6	4.8	58	64	183	56	137	206	93	47	28	1.1	.75
7	4.2	38	68	97	56	126	210	88	32	25	.79	.38
8	4.9	28	58	94	56	172	442	65	26	14	1.5	.28
9	14	25	56	73	56	174	152	55	42	8.5	1.7	.36
10	15	144	200	70	54	147	268	49	33	6.8	1.7	.81
11	10	404	476	65	54	143	252	46	28	6.8	1.8	.86
12	7.4	182	257	60	80	466	213	41	130	4.8	.89	.62
13	7.8	101	210	66	80	323	181	38	71	3.8	.78	.36
14	7.8	78	204	55	116	280	163	32	46	3.5	.36	2.8
15	9.3	58	277	55	100	197	146	34	33	35	.29	1.8
16	5.1	74	200	55	90	158	133	69	31	29	36	.57
17	4.8	56	156	50	80	144	112	54	27	12	33	.28
18	6.8	48	128	50	75	117	108	62	29	5.2	13	.26
19	5.6	66	111	50	70	102	91	58	25	3.4	6.1	.32
20	5.8	70	101	48	65	100	83	37	21	2.4	3.4	.26
21	4.7	57	216	48	65	87	76	28	18	2.6	2.2	.18
22	25	48	667	46	1360	82	70	26	16	12	1.8	.19
23	30	43	310	48	1760	97	65	25	20	13	1.6	.44
24	35	41	224	46	1100	96	62	25	21	6.4	2.8	.56
25	22	38	191	46	600	86	65	23	15	3.3	62	.35
26	18	36	136	44	366	78	56	21	9.8	3.3	45	.30
27	16	30	121	44	271	66	51	20	6.6	8.7	15	.27
28	15	28	113	42	205	68	48	44	6.8	9.8	7.1	.55
29	35	90	102	42	---	78	44	43	6.5	6.2	3.7	.34
30	48	64	231	42	---	1150	40	27	9.6	2.5	2.5	.28
31	27	---	243	46	---	1150	---	35	---	1.7	1.5	---

[redacted]

CAL YR 1964 TOTAL 49948.87 MEAN 137.0 MAX 1410 MIN .65 CFSM 1.03 IN. 13.88
WTR YR 1965 TOTAL 11680.72 MEAN 31.8 MAX 1760 MIN .18 CFSM .66 IN. 9.27

CAPTINA CREEK BASIN

03114000 CAPTINA CREEK AT ARMSTRONGS MILLS, OH

LOCATION.--Lat 39°54'31", long 80°56'27", in SE 1/4 sec. 10, T.5 N., R.4 W., Belmont County, Hydrologic Unit 05030106, on left bank at downstream side of bridge on State Highway 148, 0.5 mi (0.8 km) east of Armstrongs Mills, and 0.7 mi (1.1 km) downstream from Anderson Run.

DRAINAGE AREA.--134 mi² (347 km²).

PERIOD OF RECORD.--August 1926 to September 1935, October 1958 to current year.

REVISED RECORDS.--WSP 1907: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 738.53 ft (225.104 m) National Geodetic Vertical Datum of 1929. Aug. 20, 1926 to Sept. 30, 1935, nonrecording gage at same site, at datum 1.0 ft (0.30 m) higher.

REMARKS.--Records good except for the winter periods, which are fair. Water-quality data collected at this site 1965 to 1977. Sediment data collected 1969 to 1978.

AVERAGE DISCHARGE.--29 years, 160 ft³/s (4.531 m³/s), 16.21 in/yr (412 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,000 ft³/s (340 m³/s) Sept. 1, 1975, gage height, 13.61 ft (4.148 m); maximum gage height, 16.40 ft (4.999 m), present datum, Aug. 7, 1935; no flow at times during 1930-30, 1932, 1934, 1959, 1963-66, 1972-74.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,000 ft³/s (85.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 5	1730	4100	116	7.02	2.140	Mar. 14	1700	*5790	164	*9.30	2.835
Jan. 25	2200	4610	131	8.29	2.527	June 28	0130	3000	85.0	6.79	2.071

Minimum discharge, 0.40 ft³/s (0.011 m³/s) Sept. 12, 14, 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	17	330	85	190	66	190	120	90	111	45	30
2	100	16	220	85	170	66	160	126	53	91	30	13
3	94	17	170	80	150	66	162	106	67	190	11	7.7
4	45	17	167	80	130	66	167	104	67	150	11	6.3
5	26	10	1700	80	120	66	223	137	51	100	11	6.0
6	61	10	666	80	110	66	260	110	64	71	15	4.4
7	71	10	303	662	100	66	500	102	56	56	20	3.6
8	67	31	275	1000	90	66	305	106	106	50	30	2.7
9	223	61	317	930	85	66	263	190	420	62	19	2.0
10	105	155	235	663	80	50	208	104	96	67	15	2.3
11	67	402	167	300	75	100	100	137	66	56	42	1.7
12	60	107	170	250	70	500	105	125	56	30	16	1.3
13	67	73	170	220	65	1900	104	307	115	30	19	2.1
14	60	56	436	190	60	3070	123	430	65	49	12	1.3
15	35	50	946	170	55	1730	109	320	64	67	7.7	1.7
16	60	60	300	150	55	801	100	602	51	29	3.9	3.1
17	50	250	250	140	50	500	95	475	45	26	4.5	4.7
18	63	220	217	130	50	394	100	1600	30	21	3.3	5.9
19	60	104	175	120	50	305	202	900	174	17	2.7	3.0
20	31	107	210	120	40	403	300	305	96	16	2.7	2.7
21	34	100	402	110	40	504	370	250	64	13	2.1	1.9
22	29	113	157	110	40	490	260	196	50	13	1.6	1.9
23	27	93	135	110	40	320	200	170	40	16	1.6	2.1
24	25	89	127	110	40	207	187	190	33	30	1.6	1.9
25	23	75	220	2130	40	1040	235	157	29	27	1.3	2.0
26	21	76	140	4730	40	1020	400	127	210	19	1.3	1.0
27	20	73	100	690	40	1290	200	104	300	15	1.6	.90
28	[illegible]	75	130	460	40	970	172	91	1330	11	2.0	.80
29	[illegible]	59	110	330	---	370	154	76	290	9.0	20	1.0
30	20	144	100	290	---	272	104	71	100	8.4	10	1.4
31	16	---	90	280	---	220	---	76	---	20	61	---
TOTAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MEAN	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MIN	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CFSM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
IN.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

CAL YR 1977 TOTAL 57000.00 MEAN 156 MAX 4200 MIN 3.3 CFSM 1.16 IN 15.83
WTR YR 1978 TOTAL 62342.00 MEAN 170 MAX 3070 MIN .40 CFSM 1.26 IN 16.16

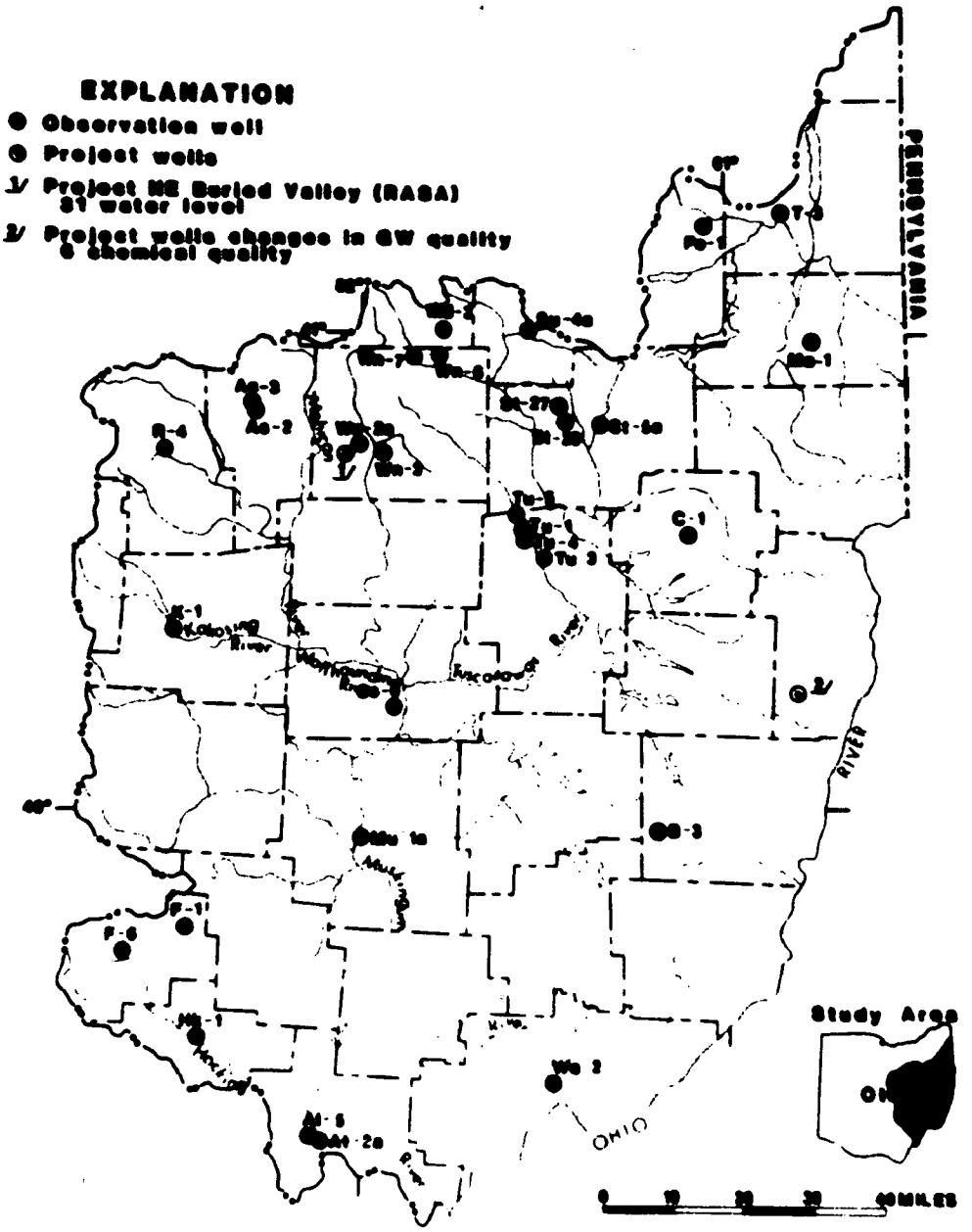


Figure 31.--Location of wells.

BELMONT COUNTY

[illegible]. Local number, B-3.
LOCATION.--Lat 40°01'19", long 81°0[illegible]'2[illegible]", Hydrologic Unit [illegible], Mt. Olivett Public Square, Mt. Olivett, OH.
Owner: Village of Mt. Olivett.
AQUIFER.--Shale of Pennsylvanian Age.
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 119 ft.
INSTRUMENTATION.--Type F continuous recorder.
DATUM.--Elevation of land-surface datum is 1258 ft above National Geodetic Vertical Datum of 1929, from topographic map. Measuring point: Floor of instrument shelter, 1.5 ft above land-surface datum.
REMARKS.--Station operated by Ohio Department of Natural Resources, Division of Water.
PERIOD OF RECORD.--July 18, 1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Maximum daily low, 61.44 ft Sept. 29-30, 1985; minimum daily low, 56.61 ft below land-surface datum, July 19-20.

WATER LEVEL (FEET) WATER YEAR OCTOBER 1984 TO SEPTEMBER 1985
MAXIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	60.36	59.03	---	57.70	59.00	57.97	58.10	58.92	59.60	60.06	60.71	61.07
2	---	58.97	---	57.86	59.13	57.86	58.19	58.93	59.74	60.06	60.70	61.10
3	---	58.95	---	57.86	59.27	57.88	58.14	59.02	59.70	60.07	60.88	61.10
4	---	58.82	---	57.88	59.31	57.87	58.05	59.04	59.80	60.09	60.85	61.10
5	---	58.68	---	57.72	59.30	57.90	57.94	59.04	59.76	60.11	60.86	61.10
6	---	58.65	---	57.73	59.15	58.11	57.93	59.01	59.80	60.15	60.88	61.07
7	---	58.67	---	57.71	59.23	58.11	57.90	59.04	59.80	60.22	60.88	61.10
8	---	58.67	---	57.88	59.33	58.06	57.90	59.10	59.71	60.23	60.85	61.10
9	---	58.63	---	57.95	59.39	58.11	58.02	59.13	59.72	60.20	60.87	61.10
10	---	58.52	---	57.95	59.41	58.13	58.05	59.13	59.76	60.20	60.88	61.12
11	---	58.42	---	57.97	59.41	58.13	57.90	59.13	59.76	60.20	60.93	61.19
12	---	[illegible]	---	58.01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	---	58.27	58.20	58.01	59.15	58.07	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	---	58.20	58.20	57.99	59.23	58.10	57.93	59.19	59.70	60.36	61.05	61.40
15	59.71	58.07	58.10	58.17	59.24	58.10	---	59.20	59.70	60.36	61.05	61.40
16	59.66	57.88	58.21	58.27	59.26	58.10	---	59.20	59.73	60.40	61.06	61.36
17	59.61	57.88	58.05	58.26	59.26	58.09	---	59.13	59.73	60.45	61.06	61.33
18	59.60	57.87	57.96	58.15	59.20	58.17	---	59.20	59.71	60.49	61.07	61.35
19	59.56	57.82	57.88	58.26	59.23	58.10	---	59.29	59.73	60.47	61.08	61.36
20	59.56	57.92	57.88	58.44	59.20	58.22	---	59.31	59.70	60.46	61.12	61.36
21	59.57	58.00	57.88	58.50	59.10	58.27	---	59.40	59.81	60.46	61.13	61.34
22	59.60	58.01	57.74	58.50	59.08	58.26	---	59.41	[illegible]	60.47	61.14	61.33
23	59.61	57.90	57.77	58.60	58.60	58.22	---	59.44	[illegible]	60.55	61.14	61.33
24	59.58	---	57.75	58.90	58.40	58.22	---	59.43	59.86	60.55	61.15	61.36
25	59.40	---	57.86	58.62	58.36	58.41	58.45	59.47	59.86	60.50	61.11	61.37
26	59.36	---	57.88	58.87	58.11	58.47	58.53	59.49	59.87	60.59	61.13	61.34
27	59.24	---	57.88	58.87	58.16	58.46	58.63	59.51	59.88	60.63	61.16	61.36
28	59.15	---	57.82	58.80	58.13	58.40	58.76	59.56	59.88	60.67	61.16	61.43
29	59.09	---	57.75	58.99	---	58.44	58.88	59.63	59.92	60.69	61.16	61.44
30	59.09	---	57.83	59.05	---	58.46	58.80	59.64	60.00	60.70	61.10	61.44
31	59.08	---	57.83	59.05	---	58.06	---	59.63	---	60.70	61.04	---
MAX	---	---	---	59.05	59.41	58.47	---	59.64	60.00	60.70	61.16	61.44

WTR YR 1985 MEAN 59.36 HIGH 57.71 JAN 7 LOW 61.44 SEP 29 AND OTHERS

HYDROLOGIC MEASUREMENTS
AND ANALYSIS

THE FOLLOWING DATA IS TAKEN FROM:

BIOLOGICAL AND WATER QUALITY STUDY
OF
McMAHON, CAPTINA AND SUNFISH CREEKS
AND SELECTED TRIBUTARIES

BELMONT AND MONROE COUNTIES, OHIO
DRAFT, APRIL 1986

PREPARED BY:

DIVISION OF WATER QUALITY
MONITORING AND ASSESSMENT
OHIO ENVIRONMENTAL PROTECTION AGENCY
COLUMBUS, OHIO 43226-1049

Appendix C Table 1. (Continued).

Station (RM) 3.3

General Location: Upstream from Steinerville, adjacent SR 148
County: Belmont
Sampling Method: Dipnet/handpick
Substrate Characterization: Primarily rubble and much coarse gravel with boulder, fine gravel, sand, silt, and detritus
Substrate Compaction: Firm
Width (Range): 25 to 50 Feet
Depth (Range): 3 to 18 inches
Habitat: Pool, riffle, run
Canopy: Open
Riparian vegetation: Large trees
Land use: Agricultural/rural

Bend Fork
Station (RM) 12.3

General Location: 20 feet upstream from Bethesda WWTP discharge
County: Belmont
Sampling Method: Dipnet/handpick
Substrate Characterization: Primarily coarse gravel with rubble, fine gravel, sand, silt and detritus
Substrate Compaction: Firm
Width (Range): 1 to 4 feet
Depth (Range): 6 to 12 inches
Habitat: Pool, riffle, run
Canopy: Closed
Riparian vegetation: Large trees
Land use: Agricultural/rural

Station (RM) 11.5

General Location: At Junction of CR 86 and TR 200
County: Belmont
Sampling Method: Dipnet/handpick
Substrate Characterization: Primarily fine gravel, and much sand and muck with coarse gravel, silt, detritus, and peat
Substrate Compaction: Soft
Width (Range): 3 to 6 Feet
Depth (Range): 1 to 12 inches
Habitat: Pool, riffle, run
Canopy: 75% open
Riparian vegetation: Grass
Land use: Agricultural/rural

Appendix C Table 1. (Continued).

Station (RM) 8.4

General Location: Downstream from Packsaddle Run
County: Belmont
Sampling Method: Dipnet/handpick
Substrate Characterization: Primarily rubble with bedrock, boulder, gravel, sand, silt and detritus
Substrate Compaction: Firm
Width (Range): 8 to 20 Feet
Depth (Range): 2 to 18 inches
Habitat: Pool, riffle, run
Canopy: 75% open
Riparian vegetation: Large trees
Land use: Agricultural/rural

Station (RM) 0.4

General Location: Near mouth
County: Belmont
Sampling Method: Dipnet/handpick
Substrate Characterization: Primarily rubble, and much bedrock and coarse gravel with boulder, fine gravel, sand, silt and detritus
Substrate Compaction: Firm
Width (Range): 15 to 25 feet
Depth (Range): 2 to 24 inches
Habitat: Pool, riffle, run
Canopy: 50% open
Riparian vegetation: Large trees
Land use: Agricultural/rural

6. 05030106-052 North Fork Captina Creek RM 10.5 - Mouth

GENERALLY GOOD TO EXCEPTIONAL

Rationale: Water quality was considered good for the entire stream segment, although some nutrient enrichment was recorded 1.5 miles downstream from the Barnesville WWTP (RM 10.5). The biological community immediately downstream from the WWTP was indicative of some organic enrichment with complete recovery documented 4 miles downstream. Good water quality and an exceptional biological community were documented in the lower segment of the North Fork Captina Creek.

7. 05030106-053 South Fork Captina Creek RM 12.0 - Mouth

GOOD

Rationale: Water quality and biological condition were considered good in the lower segment of the South Fork (RM 1.0-0). Based largely on the absence of point source dischargers and abandoned underground mines, good instream conditions appear likely in the remainder of the South Fork.

8. 05030106-050 Bend Fork RM 12.3 - Mouth

GENERALLY GOOD

Rationale: Bend Fork was generally characterized by fair-good water quality and fair-good biological condition. Biological communities revealed influences from nutrient enrichment and slightly elevated ammonia-N values in the upper stream reach, and apparently resulted from both point and nonpoint source inputs. Complete recovery in water quality and biological condition was documented at RM 8.4.

9.

05030201-061	Sunfish Creek	Headwaters - RM 22.9
05030201-059	Sunfish Creek	RM 22.9 - 14.7
05030201-057	Sunfish Creek	RM 14.7 - 7.8
05030201-055	Sunfish Creek	RM 7.8 - 7.6

GOOD

Rationale: The mainstem was generally characterized by good water quality and good biological condition. Total iron levels appeared characteristic of mine drainage influences; however, no impacts were detectable in the biological community condition.

10. 05030201-053 Sunfish Creek RM 7.6 - Mouth

EXCEPTIONAL

Rationale: The fish community in this segment of Sunfish Creek (excluding the area influenced by Ohio River backwater) exhibited a high species diversity and composite index values in the exceptional range. Water quality was characterized as good.

STATION NUMBER C02S43
39 56 17.0 080 59 29.0 2
BEND FORK AT TWP. RD. 101 (RM 3.6)
OHIO RIVER 052100 (CAPTINA CREEK)
MILES 0953.80 0871.82 018.02 003.60

PARAMETER			R	NO	MEAN	STAN DEV	MAXIMUM	MINIMUM	BEG	END
WATER	TEMP	CENT		9	18.5000	3.77492	24.0000	12.5000	83/07	83/10
CNDUCTVY	FIELD	MICROMHO		8	341.000	39.1772	390.000	278.000	83/07	83/10
CNDUCTVY	AT 25C	MICROMHO		9	396.000	40.9268	444.000	322.000	83/07	83/10
INTNSVE	SURVEY	IDENT		6	833909	.000000	833909	833909	83/07	83/10
DO	PROBE	MG/L		9	9.67222	.854103	10.9000	7.85000	83/07	83/10
BOD	5 DAY	MG/L	K	3	1.00000	.000000	1.00000	1.00000	83/07	83/08
COD	LOWLEVEL	MG/L		3	17.3333	5.50760	21.0000	11.0000	83/07	83/08
			K	1	10.0000		10.0000	10.0000	83/08	83/08
			T	4	15.5000	5.80230	21.0000	10.0000	83/07	83/08
PH		SU		8	8.13749	.226428	8.40000	7.70000	83/07	83/10
LAB	PH	SU		3	8.08000	.141490	8.23000	7.95000	83/07	83/08
T ALK	CACO3	MG/L		9	136.222	6.62971	145.000	126.000	83/07	83/10
RESIDUE	TOTAL	MG/L		6	310.000	45.1132	376.000	262.000	83/08	83/10
RESIDUE	TOT NFLT	MG/L		6	33.5000	30.0716	85.0000	6.00000	83/08	83/10
			K	1	5.00000		5.00000	5.00000	83/07	83/07
			T	7	29.4286	29.4893	85.0000	5.00000	83/07	83/10
NH3+NH4-	N TOTAL	MG/L		1	.240000		.240000	.240000	83/08	83/08
			K	8	.050000	.000052	.050000	.050000	83/07	83/10
			T	9	.071111	.063333	.240000	.050000	83/07	83/10
NO2-N	TOTAL	MG/L		2	.025000	.007071	.030000	.020000	83/07	83/08
			K	6	.020000	.000023	.020000	.020000	83/07	83/10
			T	8	.021250	.003536	.030000	.020000	83/07	83/10
NO3-N	TOTAL	MG/L		8	1.58000	4.01306	11.5000	.050000	83/07	83/10
			K	1	.100000		.100000	.100000	83/09	83/09
			T	9	1.41555	3.78615	11.5000	.050000	83/07	83/10
TOT KJEL	N	MG/L		9	.400000	.223607	.800000	.200000	83/07	83/10
PHOS-TOT		MG/L P		4	.152500	.085391	.270000	.080000	83/07	83/09
			K	5	.050000	.000061	.050000	.050000	83/07	83/10
			T	9	.095555	.075185	.270000	.050000	83/07	83/10
TOT HARD	CACO3	MG/L		6	196.500	5.85662	203.000	189.000	83/07	83/09
CALCIUM	CA-TOT	MG/L		9	57.2999	2.53838	60.3000	52.7000	83/07	83/10
MGNSIUM	MG,TOT	MG/L		9	12.3111	1.19529	13.7000	10.2000	83/07	83/10
CHLORIDE	TOTAL	MG/L		7	9.12857	3.45579	14.0000	3.00000	83/07	83/10
SULFATE	SO4-TOT	MG/L		7	65.1000	15.5662	86.7000	45.0000	83/07	83/10
CADMIUM	CD,TOT	UG/L	K	1	.500000		.500000	.500000	83/08	83/08
CHROMIUM	CR,TOT	UG/L	K	2	30.0000	.000000	30.0000	30.0000	83/07	83/08
COPPER	CU,TOT	UG/L	K	2	10.0000	.000000	10.0000	10.0000	83/08	83/08
IRON	FE,TOT	UG/L		7	1035.00	1159.26	3550.00	290.000	83/07	83/10
LEAD	PB,TOT	UG/L		1	2.00000		2.00000	2.00000	83/08	83/08
			K	1	2.00000		2.00000	2.00000	83/07	83/07
			T	2	2.00000	.000000	2.00000	2.00000	83/07	83/08
MANGNESE	MN	UG/L		6	45.8333	30.8896	90.0000	20.0000	83/07	83/10
NICKEL	NI,TOTAL	UG/L	K	4	40.0000	.000000	40.0000	40.0000	83/07	83/08
ZINC	ZN,TOT	UG/L		3	13.3333	5.77352	20.0000	10.0000	83/08	83/09
			K	4	10.0000	.000000	10.0000	10.0000	83/07	83/10
			T	7	11.4286	3.77965	20.0000	10.0000	83/07	83/10
ALUMINUM	AL,TOT	UG/L		6	978.333	612.583	2040.00	310.000	83/08	83/10
			K	1	500.000		500.000	500.000	83/07	83/07
			T	7	910.000	587.708	2040.00	310.000	83/07	83/10
RESIDUE	DISS-180 C	MG/L		7	260.286	18.7069	282.000	228.000	83/07	83/10

STATION NUMBER C02S44
39 58 00.0 081 02 10.0 2
BEND FORK AT TWP. RD. 192 (RM 8.4)
OHIO RIVER 052100 (CAPTINA CREEK)
MILES 0953.80 0871.82 018.02 008.40

PARAMETER			R	NO	MEAN	STAN DEV	MAXIMUM	MINIMUM	BEG	END
WATER	TEMP	CENT		6	18.9167	3.77388	23.0000	13.0000	83/07	83/10
CNDUCTVY	FIELD	MICROMHO		5	418.000	47.8748	495.000	372.000	83/07	83/10
CNDUCTVY	AT 25C	MICROMHO		6	454.000	51.1742	511.000	385.000	83/07	83/10
INTNSVE	SURVEY	IDENT		6	833909	.000000	833909	833909	83/07	83/10
DO	PROBE	MG/L		6	8.24166	.855845	9.20000	7.10000	83/07	83/10
BOD	5 DAY	MG/L		1	1.40000		1.40000	1.40000	83/08	83/08
			K	2	1.00000	.000000	1.00000	1.00000	83/07	83/08
			T	3	1.13333	.230940	1.40000	1.00000	83/07	83/08
COD	LOWLEVEL	MG/L		3	16.0000	1.00000	17.0000	15.0000	83/07	83/08
PH		SU		6	7.89999	.212408	8.25000	7.60000	83/07	83/10
LAB	PH	SU		3	7.99999	.114320	8.08000	7.87000	83/07	83/08
T ALK	CACO3	MG/L		5	139.000	35.5176	198.000	102.000	83/07	83/09
RESIDUE	TOTAL	MG/L		5	363.600	11.0877	374.000	346.000	83/08	83/10
RESIDUE	TOT NFLT	MG/L		6	43.8333	23.7775	87.0000	22.0000	83/07	83/10
NH3+NH4-	N TOTAL	MG/L		2	.060000	.014142	.070000	.050000	83/08	83/09
			K	4	.050000	.000050	.050000	.050000	83/07	83/10
			T	6	.053333	.008165	.070000	.050000	83/07	83/10
NO2-N	TOTAL	MG/L		3	.020000	.000000	.020000	.020000	83/08	83/10
			K	2	.020000	.000000	.020000	.020000	83/07	83/08
			T	5	.020000	.000020	.020000	.020000	83/07	83/10
NO3-N	TOTAL	MG/L		6	.823333	.368439	1.41000	.290000	83/07	83/10
TOT KJEL	N	MG/L		6	.466666	.121107	.600000	.300000	83/07	83/10
PHOS-TOT		MG/L P		6	.426666	.224738	.800000	.180000	83/07	83/10
TOT HARD	CACO3	MG/L		5	199.000	7.34847	207.000	189.000	83/07	83/09
CALCIUM	CA-TOT	MG/L		6	58.6999	2.07459	61.4000	56.3000	83/07	83/10
MGNSIUM	MG,TOT	MG/L		6	13.1000	.732211	13.9000	11.8000	83/07	83/10
CHLORIDE	TOTAL	MG/L		6	15.8333	4.32882	21.2000	9.50000	83/07	83/10
SULFATE	SO4-TOT	MG/L		6	74.5000	10.9316	85.0000	55.0000	83/07	83/10
CADMIUM	CD,TOT	UG/L	K	3	.500000	.000000	.500000	.500000	83/07	83/08
CHROMIUM	CR,TOT	UG/L	K	2	30.0000	.000000	30.0000	30.0000	83/07	83/08
COPPER	CU,TOT	UG/L	K	3	10.0000	.000000	10.0000	10.0000	83/07	83/08
IRON	FE,TOT	UG/L		6	1698.33	854.646	3360.00	1030.00	83/07	83/10
LEAD	PB,TOT	UG/L		1	3.00000		3.00000	3.00000	83/08	83/08
			K	2	2.00000	.000000	2.00000	2.00000	83/07	83/08
			T	3	2.33333	.577352	3.00000	2.00000	83/07	83/08
MANGNESE	MN	UG/L		6	131.667	38.0352	200.000	100.000	83/07	83/10
NICKEL	NI,TOTAL	UG/L	K	4	40.0000	.000000	40.0000	40.0000	83/07	83/08
ZINC	ZN,TOT	UG/L		4	12.5000	2.88675	15.0000	10.0000	83/08	83/09
			K	2	10.0000	.000000	10.0000	10.0000	83/07	83/10
			T	6	11.6667	2.58200	15.0000	10.0000	83/07	83/10
ALUMINUM	AL,TOT	UG/L		5	1232.00	297.943	1610.00	910.000	83/07	83/10
			K	1	200.000		200.000	200.000	83/08	83/08
			T	6	1060.00	498.518	1610.00	200.000	83/07	83/10
RESIDUE	DISS-180 C	MG/L		6	306.833	23.3460	331.000	272.000	83/07	83/10

STATION NUMBER C02S45
40 00 05.0 081 02 55.0 2
BEND FK DST BETHESDA- TWP RD 200 (RM 11.15)
OHIO RIVER 052100 (CAPTINA CREEK)
MILES 0953.80 0871.82 018.02 011.15

PARAMETER			R	NO	MEAN	STAN DEV	MAXIMUM	MINIMUM	BEG	END
WATER	TEMP	CENT		6	18.5000	3.08221	22.0000	14.0000	83/07	83/10
CNDUCTVY	FIELD	MICROMHO		5	546.800	72.2634	625.000	462.000	83/07	83/10
CNDUCTVY	AT 25C	MICROMHO		6	597.333	57.3480	672.000	536.000	83/07	83/10
INTNSVE	SURVEY	IDENT		6	833909	.000000	833909	833909	83/07	83/10
DO	PROBE	MG/L		6	6.84166	.717254	7.60000	6.00000	83/07	83/10
BOD	5 DAY	MG/L		3	3.56667	1.95021	5.80000	2.20000	83/07	83/08
COD	LOWLEVEL	MG/L		3	25.3333	4.61885	28.0000	20.0000	83/07	83/08
PH		SU		5	7.61000	.288217	8.00000	7.20000	83/07	83/10
LAB	PH	SU		3	7.72000	.096081	7.82000	7.63000	83/07	83/08
T ALK	CACO3	MG/L		5	129.400	51.1890	189.000	48.0000	83/07	83/10
RESIDUE	TOTAL	MG/L		5	435.400	29.0675	463.000	386.000	83/08	83/10
RESIDUE	TOT NFLT	MG/L		5	16.2000	12.3167	37.0000	6.00000	83/08	83/10
			K	1	5.00000		5.00000	5.00000	83/07	83/07
			T	6	14.3333	11.9276	37.0000	5.00000	83/07	83/10
NH3+NH4-	N TOTAL	MG/L		5	2.00600	.597643	2.84000	1.32000	83/08	83/10
			K	1	.050000		.050000	.050000	83/07	83/07
			T	6	1.68000	.960936	2.84000	.050000	83/07	83/10
NO2-N	TOTAL	MG/L		4	.265000	.114455	.380000	.110000	83/07	83/10
NO3-N	TOTAL	MG/L		6	3.37333	1.07413	5.10000	2.03000	83/07	83/10
TOT KJEL	N	MG/L		6	2.40000	.933808	3.50000	.700000	83/07	83/10
PHOS-TOT		MG/L P		6	2.39667	.638394	3.46000	1.66000	83/07	83/10
TOT HARD	CACO3	MG/L		5	223.600	5.85902	231.000	215.000	83/07	83/09
CALCIUM	CA-TOT	MG/L		6	65.2666	2.87174	70.1000	62.2000	83/07	83/10
MGNSIUM	MG,TOT	MG/L		6	15.5000	.707107	16.3000	14.5000	83/07	83/10
CHLORIDE	TOTAL	MG/L		6	32.4667	13.5212	50.0000	9.50000	83/07	83/10
SULFATE	SO4-TOT	MG/L		6	91.8333	11.3213	100.000	70.0000	83/07	83/10
CADMIUM	CD,TOT	UG/L	K	4	.500000	.000000	.500000	.500000	83/07	83/08
CHROMIUM	CR,TOT	UG/L	K	3	30.0000	.000000	30.0000	30.0000	83/07	83/08
COPPER	CU,TOT	UG/L	K	3	10.0000	.000000	10.0000	10.0000	83/07	83/08
IRON	FE,TOT	UG/L		6	585.000	406.682	1290.00	240.000	83/07	83/10
LEAD	PB,TOT	UG/L		1	3.00000		3.00000	3.00000	83/08	83/08
			K	3	2.00000	.000000	2.00000	2.00000	83/07	83/08
			T	4	2.25000	.500000	3.00000	2.00000	83/07	83/08
MANGNESE	MN	UG/L		6	193.333	53.0725	255.000	120.000	83/07	83/10
NICKEL	NI,TOTAL	UG/L	K	4	40.0000	.000000	40.0000	40.0000	83/07	83/08
ZINC	ZN,TOT	UG/L		2	15.0000	.000000	15.0000	15.0000	83/08	83/10
			K	4	10.0000	.000000	10.0000	10.0000	83/07	83/09
			T	6	11.6667	2.58200	15.0000	10.0000	83/07	83/10
ALUMINUM	AL,TOT	UG/L		5	672.000	358.288	1300.00	430.000	83/08	83/10
			K	1	500.000		500.000	500.000	83/07	83/07
			T	6	643.333	328.065	1300.00	430.000	83/07	83/10
RESIDUE	DISS-180	C MG/L		6	402.000	24.2652	420.000	358.000	83/07	83/10

HYDROLOGIC MEASUREMENTS
AND ANALYSIS

POWHATAN NO. 6 MINE
R-0360-2

As noted in Addendum No. 3, Seasonal Variations of Water Quality and Quantity, precipitation is the principal influencing factor upon all water systems. With an increase in precipitation or snowmelt, soil moisture will increase and cause a rise in the groundwater levels. Best conditions for groundwater recharge are those of prolonged rainfall periods. Most intensive percolation occurs as a consequence of winter precipitation and spring thaw. Amounts of available moisture in the soil will influence the chemical composition of groundwater. Dilution of dissolved solid contents increases during periods of natural recharge.

The following pages contain documentation of amounts of precipitation received in Ohio during 1986 and the first half of 1987. These measurements indicate the seasonal fluctuation which occurred in available moisture quantities. Fluctuations in water quality (total dissolved solids) can be inferred from increases or decreases in precipitation.

ODNR
OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER

Richard F. Celeste
Governor

Joseph J. Sommer
Director

Naturally OHIO the heart of it all!

JANUARY 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

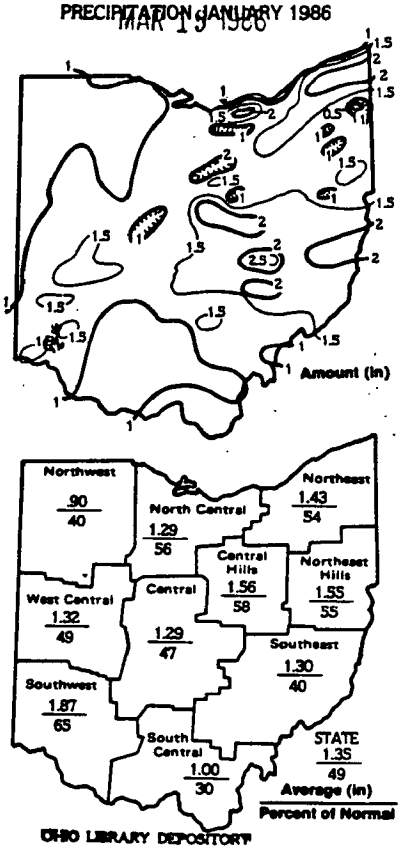
Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for January was noticeably below normal throughout the state. The average for the state as a whole was 1.35 inches, 1.41 inches below normal. Regional averages ranged from 1.56 inches, 1.11 inches below normal, for the Central Hills region to 0.90 inch, 1.33 inches below normal, for the Northwest region. Regional departures from normal ranged from 2.29 inches below normal for the South Central region to 1.01 inches below normal for the Southeast region. Norwich, Muskingum County, reported the greatest amount of precipitation for the month, 2.90 inches, and Mosquito Creek Lake, Trumbull County, reported the least amount, 0.38 inch.

There was minimal precipitation during the first half of the month, mostly in the form of light snow flurries. The bulk of the month's precipitation came in the form of light rain during the remainder of the month. Generally, about 50 percent of the month's precipitation fell on the 19th. About 80 percent of the state received between 0.5 and 1.5 inches of precipitation; only a small area in the northeast and the east central portions received more than 2 inches. Chardon, Geauga County, reported 25.7 inches of snow for the month, the bulk of which fell the last half of the month. Snowfall for the season thus far at Chardon totals 61.5 inches, 88 percent of normal. The below-normal precipitation during the past two months has had no serious effect on the water supply situation. This January proved to be comparatively mild and serene.

Cumulative precipitation for the first four months of the 1986 water year remains above normal throughout the state. The average for the state as a whole is 15.49 inches, 5.23 inches above normal. Regional averages range from 17.53 inches, 7.16 inches above normal, for the Southeast region to 12.33 inches, 2.91 inches above normal, for the Northwest region.

PRECIPITATION JANUARY 1986



FEB

ODNR
OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER

Richard F. Celeste
Governor

Joseph J. Sommer
Director

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FEBRUARY 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

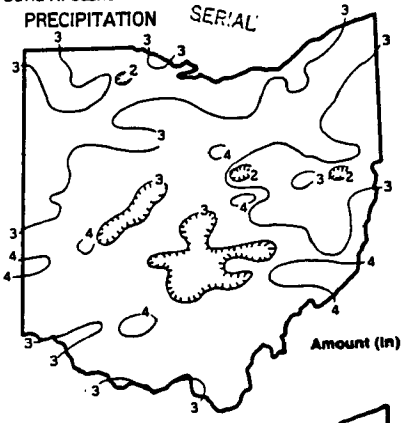
PRECIPITATION for February was noticeably above normal throughout the state. The average for the state as a whole was 3.19 inches, 0.90 inch above normal. Regional averages ranged from 3.52 inches, 0.72 inch above normal, for the Southwest region to 2.79 inches, 0.93 inch above normal, for the Northwest region. Departures from normal ranged from 1.24 inches above normal for the Central Hills region to 0.59 inch above normal for the South Central region. McConnelsville, Morgan County, reported the greatest amount of precipitation for the month, 4.67 inches; New Carlisle, Clark County, reported 4.58 inches. Carrollton, Carroll County, reported the least amount, 1.68 inches.

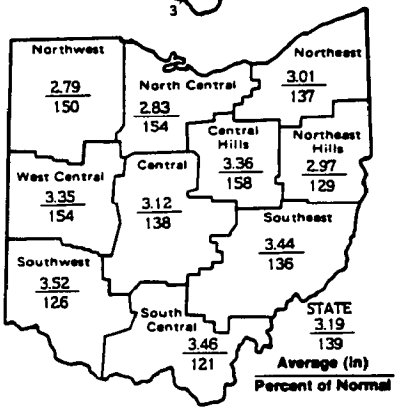
There was precipitation in the form of light rain or snow during every week except in southeast Ohio where as much as 7 inches of snow fell on the 11th. The greatest amounts of precipitation were reported on the 4th, 6th and 21st. A major portion of the state received between 2.5 and 3.5 inches of precipitation. Only a few isolated stations scattered throughout the state received less than 2 inches or more than 4 inches. Snowfall at Chardon, Geauga County, totaled 9.8 inches, less than half that normally observed for February. However, southeast Ohio received unusally heavy snows during the month; Athens reported 17.6 inches, 13 inches above normal. This was a good month for recharge to water supplies.

Cumulative precipitation for the first two months of the 1986 calendar year was generally below normal throughout the state; the only exception being the Central Hills region where precipitation was slightly above normal. The average for the state as a whole was 4.54 inches, 0.51 inch below normal. Regional averages ranged from 5.31 inches, 0.10 inch below normal, for the Southeast region to 3.69 inches, 0.40 inch below normal, for the Northwest region. Departures from normal ranged from 1.70 inches below normal for the South Central region to 0.13 inch above normal for the Central Hills region.

Cumulative precipitation for the first five months of the 1986 water year was noticeably above normal throughout the state; the major portion of this water year's precipitation came in November 1985. The average for the state as a whole was 18.68 inches, 6.13 inches above normal. Regional averages ranged from 20.97 inches, 8.07 inches above normal, for the Southeast region to 15.12 inches, 3.84 inches above normal, for the Northwest region. Although it has been an excellent season for recharge to water supplies thus far, the bulk of the season's recharge resulted from the excessive precipitation in November.

PRECIPITATION





March 86

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Joseph J. Sommer
Director

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MARCH 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

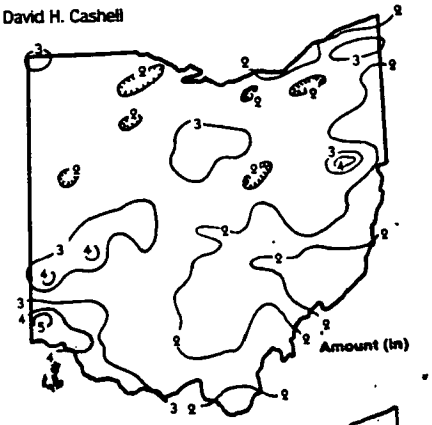
Compiled by Leonard J. Harstine and David H. Cashell

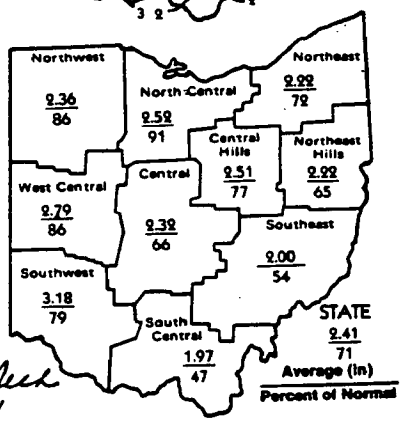
PRECIPITATION for March was noticeably below normal throughout the state. The average for the state as a whole was 2.41 inches, 1.00 inch below normal. Regional averages ranged from 3.18 inches, 0.85 inch below normal, for the Southwest region to 1.97 inches, 2.26 inches below normal, for the South Central region. The Southwest Ohio Water Company south of Venice, Hamilton County, reported the greatest amount of precipitation for the month, 5.57 inches, of which 2.25 inches fell on the 12th. Circleville, Pickaway County, reported the least amount for the month, 1.01 inches.

Moderate amounts of precipitation fell every week; the only exception was on the 19th when over 2 inches was observed at numerous stations in the southwest portion of the state. Generally, nearly two-thirds of the state received between 2 and 3 inches of precipitation. The southeast third received between 1 and 2 inches. Snowfall at Chardon, Geauga County, was only 8 inches, 40 percent of that usually observed for March; total for the season is 81.6 inches, 19.3 inches below normal. The below normal precipitation for March resulted in reduced recharge to ground-water supplies. This may have very well cut the recharge season short by at least a month, as conditions do not auger well for significant recharge to water supplies in the remaining month of the recharge season.

Cumulative precipitation for the first three months of the 1986 calendar year is noticeably below normal throughout the state. The average for the state as a whole is 6.95 inches, 1.51 inches below normal. Regional averages range from 8.00 inches, 2.06 inches below normal, for the Southwest region to 6.05 inches, 0.80 inch below normal, for the Northwest region. Departures from normal range from 3.96 inches below normal for the South Central region to 0.60 inch below normal for the Central Hills region.

Cumulative precipitation for the first six months of the 1986 water year continues to be markedly above normal throughout the state. However, the bulk of this surplus precipitation fell in November. The average for the state as a whole is 21.09 inches, 5.13 inches above normal. Regional averages range from 22.98 inches, 4.95 inches above normal, for the Southwest region to 17.48 inches, 3.44 inches above normal, for the Northwest region. Regional averages range from 6.69 inches above normal for the Central Hills region to 2.11 inches above normal for the South Central region.





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APRIL 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

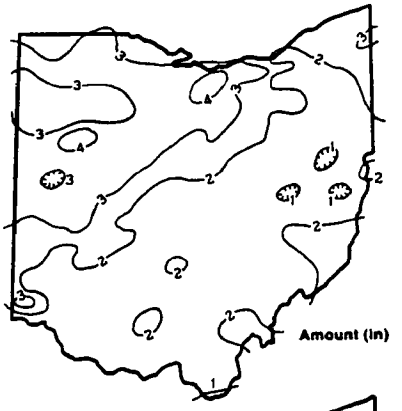
Compiled by Leonard J. Harstine and David H. Cashell

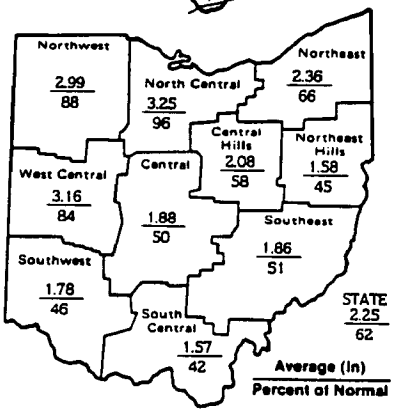
PRECIPITATION for April was noticeably below normal throughout the state for the second consecutive month. The average for the state as a whole was 2.25 inches, 1.37 inches below normal. Regional averages ranged from 3.25 inches, 0.14 inch below normal, for the North Central region to 1.57 inches, 2.18 inches below normal, for the South Central region. Lima, Allen County, reported the greatest amount of precipitation for the month, 4.53 inches and Carrollton, Carroll County, reported the least amount, 0.33 inch, a record low for April for that station.

There was precipitation during every week; however, the bulk of the month's precipitation fell during the second and third weeks. Heaviest precipitation fell in the western and northern portions of the state. Generally, half of the state north of a line from Cincinnati through Delaware to Youngstown received from 2 to 4 inches and the remaining half south of this line received between 1 and 2 inches. Water supplies will be affected by the lack of recharge in both March and April as a result of the deficient precipitation. Although the effects are not significant at present, much depends on weather conditions during the next six months.

Cumulative precipitation for the first four months of the 1986 calendar year is below normal throughout the state. The average for the state as a whole is 9.20 inches, 2.88 inches below normal. Regional averages range from 10.62 inches, 1.29 inches below normal, for the West Central region to 8.00 inches, 6.14 inches below normal, for the South Central region. It is interesting to note that climatic conditions are very similar to those that existed for the first four months of 1985.

Cumulative precipitation for the first seven months of the 1986 water year continues to be noticeably above normal for most of the state; one exception is the South Central region where precipitation is slightly below normal. The average for the state as a whole is 23.34 inches, 3.76 inches above normal. Regional averages range from 24.83 inches, 4.57 inches above normal, for the Southeast region to 20.47 inches, 3.02 inches above normal, for the Northwest region. Departures from normal for the water year thus far range from 5.54 inches above normal for the North Central region to 0.07 inch below normal for the South Central region.





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MAY 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

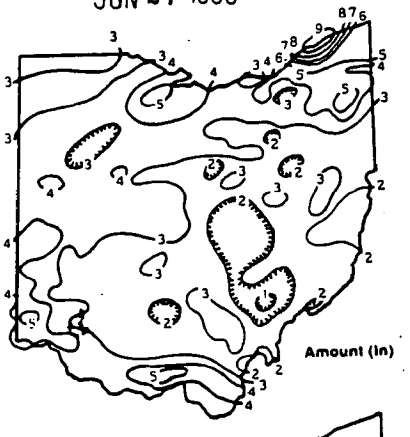
Compiled by Leonard J. Harstine and David H. Cashell

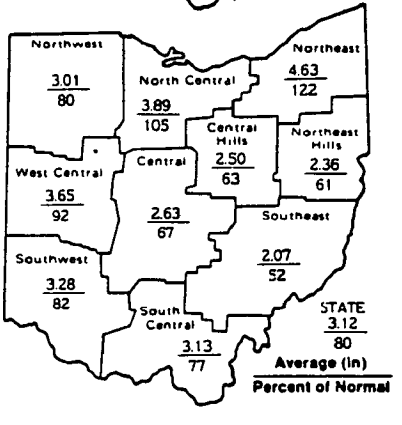
PRECIPITATION for May was below normal throughout most of the state for the third consecutive month. Only the North Central and Northeast regions recorded precipitation above normal for the month. The average for the state as a whole was 3.12 inches, 0.79 inch below normal. Regional averages ranged from 4.63 inches, 0.82 inch above normal, for the Northeast region to 2.07 inches, 1.91 inches below normal, for the Southeast region. Painesville, Lake County, reported the greatest amount of precipitation for the month, 9.76 inches, of which 7.95 inches fell on four days—May 6, 7, 16 and 19. Amesville, Athens County, reported the least amount for the month, 0.91 inch.

There were substantial amounts of precipitation during every week of the month at scattered points throughout the state. The bulk of the month's rain fell on the 6th, 7th, 16th, 19th and 27th. Generally, half of the state north of a line running from Cincinnati through Columbus to Youngstown received between 3 to 5 inches with 5 to 9.76 inches in the extreme northeast corner. The remaining half south of this line received between 1 to 3 inches. Stations in the northeast reported as much as 2.70 inches in a 24-hour period. However, in the South Central and Southeastern portion of the state continued dry conditions are beginning to put considerable stress on the water supply situation.

Cumulative precipitation for the first five months of the 1986 calendar year continues to be below normal throughout the state. The average for the state as a whole is 12.32 inches, 3.67 inches below normal. Regional averages range from 14.27 inches, 1.61 inch below normal, for the North Central region to 10.68 inches, 5.19 inches below normal, for the Northeast Hills region. Other regions showing excessive departures from normal for the calendar year thus far are: Central, 5.06 inches below normal; South Central, 7.08 inches below normal; and Southeast, 5.51 inches below normal.

Cumulative precipitation for the first eight months of the 1986 water year remains above normal throughout most of the state; one exception is the South Central region where it is below normal. The average for the state as a whole is 26.46 inches, 2.97 inches above normal. Regional averages range from 28.86 inches, 5.08 inches above normal, for the Northeast region to 23.48 inches, 2.29 inches above normal, for the Northwest region. Departures from normal range from 5.72 inches above normal for the North Central region to 1.01 inches below normal for the South central region.





June 86

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JUNE 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

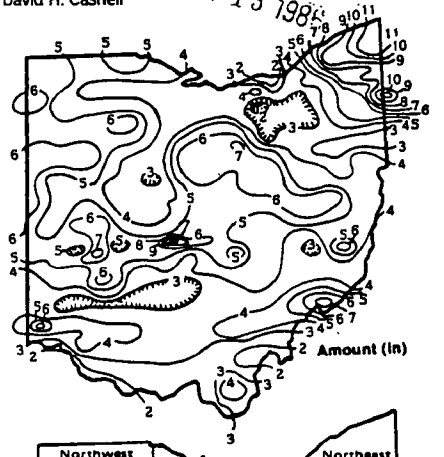
PRECIPITATION for June was noticeably above normal for most areas of the state; exceptions were in the North Central and South Central regions where it was below normal. Precipitation has been above normal for the state in only two months this year. The average for the state as a whole was 4.61 inches, 0.79 inch above normal. Regional averages ranged from 6.69 inches, 3.09 inches above normal, for the Northeast region to 2.80 inches, 0.84 inch below normal, for the South Central region. Andover, Ashtabula County, reported the greatest amount of precipitation for the month, 11.11 inches; Ashtabula reported 11.00 inches and Youngstown Airport reported 10.66 inches. Salem Center, Meigs County, reported the least amount, 1.13 inches.

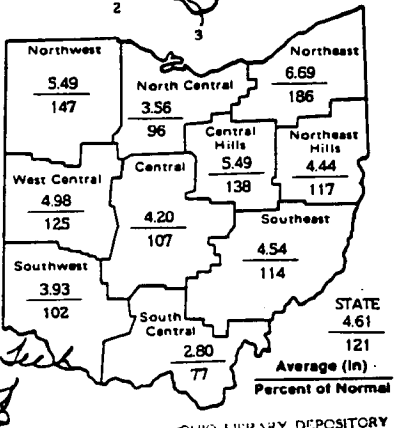
There were substantial amounts of precipitation during every week of the month in most areas of the state. The bulk of the precipitation was produced by heavy, localized thunderstorms; greater amounts resulted from very intensive storms. One of the most intensive storms was reported in Wyandot and Crawford counties where Robert Stuckey reported 5.5 inches in 3 hours about 1 mile east of Upper Sandusky at the corner of State Route 30 and County Road 34.

The heavy rains in the northeast resulted in considerable flooding in Ashtabula County, which was designated a disaster area by Gov. Celeste. Generally, about one-third of the state south of a line running from Cincinnati through Columbus to East Liverpool received less than 4 inches for the month. Thus, the southern portions of the state continue be noticeably deficient in precipitation for the year. The above normal precipitation was generally most beneficial to both agriculture and water supplies.

Cumulative precipitation for the first six months of the 1986 calendar year continues to be noticeably below normal for most areas of the state; the only exception is the Northeast region where precipitation is above normal. The average for the state as a whole is 16.93 inches, 2.88 inches below normal. Regional averages range from 20.34 inches, 1.43 inches above normal, for the Northeast region to 13.93 inches, 7.92 inches below normal, for the South Central region.

Cumulative precipitation for the first nine months of the 1986 water year continues to be noticeably above normal for most of the state; one exception is the South Central region where it is below normal. The average for the state as a whole is 31.07 inches, 3.76 inches above normal. Regional averages range from 35.55 inches, 8.17 inches above normal, for the Northwest region to 27.89 inches, 1.85 inches below normal, for the South Central region.





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JULY 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

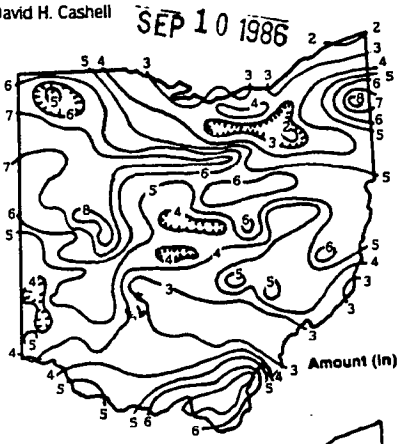
Compiled by Leonard J. Harstine and David H. Cashell

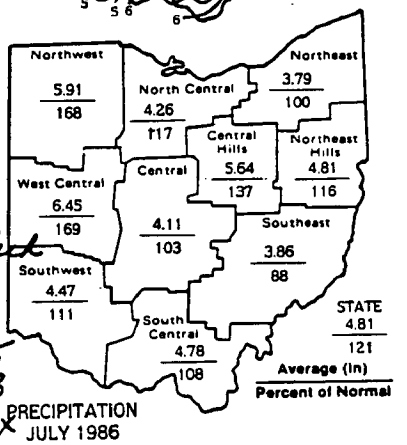
PRECIPITATION for July was above normal for the second consecutive month for most areas of the state: the only exception was the Southeast region where precipitation was below normal. The average for the state as a whole was 4.81 inches, 0.83 inch above normal. Regional averages ranged from 6.45 inches, 2.64 inches above normal, for the West Central region to 3.79 inches, 0.01 inch above normal, for the Northeast region; the Southeast region with 3.86 inches was 0.52 inch below normal. Mansfield Airport, Richland County, reported the greatest amount of precipitation for the month, 8.56 inches and the Akron city station reported the least amount, 1.45 inches.

The bulk of the month's precipitation fell during the first 16 days although isolated areas in the northwest, northeast and southern portions of the state received small amounts of rain the last week. The greatest portion of the month's rain fell on the 1st, 9th, 11th and 12th in typical heavy, summer-type thunderstorms. The precipitation in the first half of the month was most beneficial to both agriculture and water supplies in most areas. However, areas in the southern half of the state continue to be noticeably dry. Even so, deficiencies in general have not reached drought proportions as compared to previous drought periods.

Cumulative precipitation for the seven months of the 1986 calendar year continues to be below normal for the central and southern portions of the state; the northern portion continues to be above normal. The average for the state as a whole is 21.74 inches, 2.05 inches below normal. Regional averages range from 25.70 inches, 2.04 inches above normal, for the West Central region to 18.71 inches, 7.57 inches below normal, for the South Central region.

Cumulative precipitation for the 10 months of the 1986 water year continues to be noticeably above normal throughout most of the state; the only exception is in the South Central portion where cumulative precipitation has been below normal for the past four months. The average for the state as a whole is 35.88 inches, 4.59 inches above normal. Regional averages range from 39.34 inches, 8.18 inches above normal, for the Northeast region to 32.67 inches, 1.50 inches below normal, for the South Central region.





PRECIPITATION
JULY 1986

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AUGUST 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for August was below normal throughout most of the state; the only exception was the Northwest region where precipitation was noticeably above normal. The average for the state as a whole was 2.61 inches, 0.39 inch below normal. Regional averages ranged from 4.55 inches, 6.79 inches above normal, for the Northwest region to 1.94 inches, 0.95 inch below normal, for the Northeast Hills region. Maumee State Forest near Swanton, Fulton County, reported the greatest amount of precipitation for the month, 6.79 inches and Kirwan Dam near Ravenna, Portage County, reported the least amount, 0.59 inch.

Although there was precipitation somewhere in the state during every week of the month, it was rather thin and widely scattered. Only a few widely scatter, heavy thunderstorms, which produced more than one-half inch of precipitation, were observed. Generally, most of the precipitation occurred the night of the 26th-27th when 1.0 inch or more fell throughout most areas of the state. The lack of precipitation during the month has begun to create some problems for water supplies in areas where the sources of water are marginal to begin with. Reports of reservoirs reaching critical low levels have been received, especially in the southeastern portion of the state where precipitation deficiencies are the greatest.

Cumulative precipitation for the 1986 calendar year continues to be below normal throughout the state; the only exceptions are in the Northwest, Northeast and West Central regions where it has been above normal for the past two months. The average for the state as a whole is 24.35 inches, 2.44 inches below normal. Regional averages range from 28.00 inches, 4.00 inches above normal, for the Northwest region to 21.50 inches, 5.65 inches below normal, for the Central region. Departures from normal for the calendar year range from 4.00 inches above normal for the Northwest region to 7.72 inches below normal for the South Central region.

Cumulative precipitation for the 1986 water year thus far remains above normal for most of the state; the only exception is the South Central region where it is below normal. The average for the state as a whole is 38.49 inches, 4.20 inches above normal. Regional averages range from

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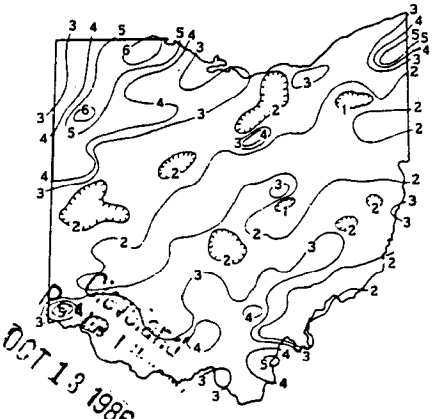

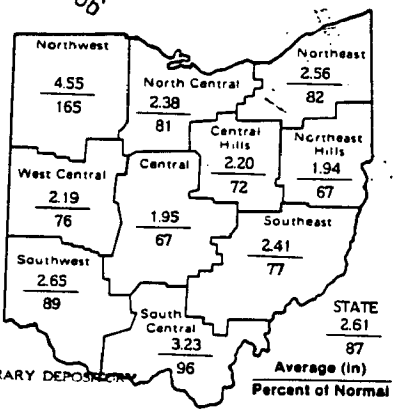

Sept

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SEPTEMBER 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for September reached well above normal throughout the state. The average for the state as a whole was 4.50 inches, 1.75 inches above normal. Regional averages ranged from 6.01 inches, 3.02 inches above normal, for the Central Hills region to 3.28 inches, 0.55 inch above normal, for the Southeast region. LaRue, Marion County, reported the greatest amount of precipitation for the month, 8.64 inches and North Georgetown, Columbiana County, reported the least amount, 1.66 inches.

Substantial amounts of precipitation fell during every week of the month in most areas of the state. Storms producing more than one inch of rainfall occurred during the first, second and fourth week of the month in many areas of the state. However, a large portion of the eastern and southeastern areas along the Ohio River received less than 3.0 inches for the month. Although these rains helped to relieve some of the water problems in this area during the past several months, the water supply situation still remains serious for a few isolated cases. A large area in the central section of the state north of Dayton and Columbus received between 6.0 and 8.74 inches. About two-thirds of the state received more than 5.0 inches of rainfall for the month. Although the abundant precipitation during the month helped water supplies, it may create problems for fall harvesting.

Cumulative precipitation for the 1986 calendar year thus far is above normal in the five northern regions while it is below normal in the five southern and eastern regions. Cumulative precipitation for the state as a whole is 28.85 inches, 0.69 inches below normal. Regional averages range from 33.03 inches, 6.37 inches above normal, for the Northwest region to 25.33 inches, 5.62 inches below normal, for the Southeast region; the South Central region shows the greatest departure for the calendar year, 7.21 inches below normal.

Precipitation for the 1986 water year, which began Oct. 1, 1985, and ended Sept. 30, 1986, was above normal throughout the year for most areas of the state. This was generally due to the record-breaking precipitation in November 1985. The average for the state as a whole was 42.99 inches, 5.95 inches above normal. Regional averages ranged from 46.70 inches, 9.60 inches above normal, for the Northeast region to 39.40 inches, 1.14 inches below normal, for the South Central region. Mansfield, Richland County, reported the greatest amount of precipitation for the water year, 62.54 inches and Amesville, Athens County, reported the least amount, 31.02 inches. An isohyetal map and regional averages and departures from normal for the 1986 water year appear on the back page of this report.

The water supply situation showed marked improvement during the first three months of the 1986 water year. This was primarily a result of the all-time record-breaking precipitation in November. Although precipitation was below normal during the remaining three

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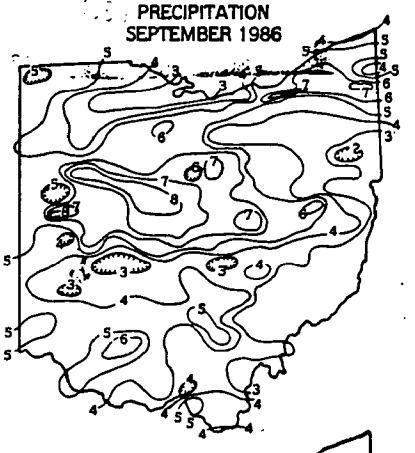
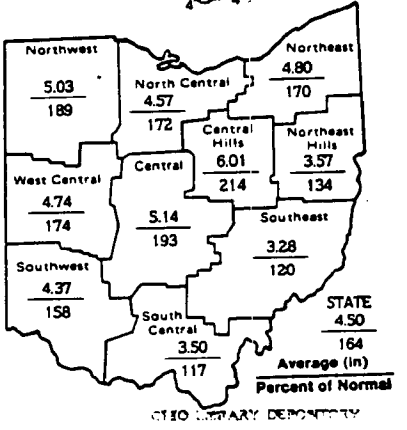
PRECIPITATION
SEPTEMBER 1986





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OCTOBER 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

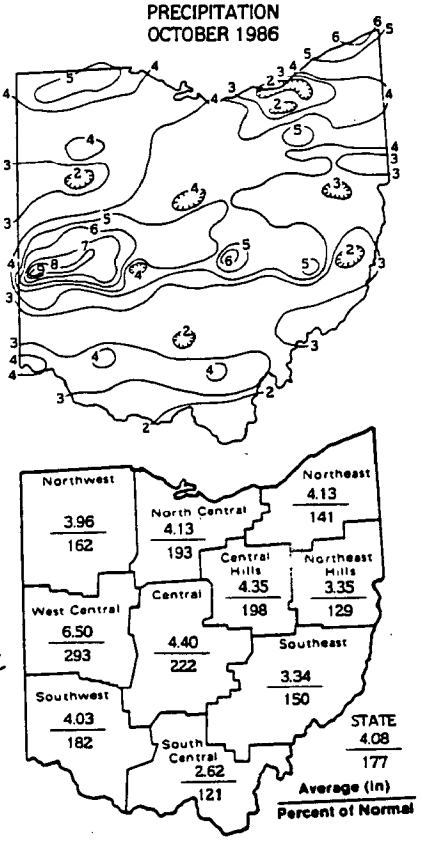
PRECIPITATION for October was noticeably above normal throughout the state. This is the second consecutive month in which precipitation has been well above normal. The average for the state as a whole was 4.08 inches, 1.77 inches above normal. Regional averages ranged from 6.50 inches, 4.28 inches above normal, for the West Central region to 2.62 inches, 0.46 inch above normal, for the South Central region. West Manchester, Preble County, reported the greatest amount of precipitation for the month, 9.88 inches, and Barkcamp State Park, Belmont County, reported the least amount, 1.06 inches.

Substantial amounts of precipitation fell in most areas of the state during October; for the west central and central areas it was excessive. The bulk of the month's rainfall fell during the first five days. During this period, the central portion received about 4.5 inches while the west central portion reported 4 to 8 inches. While there was no serious flooding, these heavy rains produced some record-high streamflows for October. About one-half of the state received between 4 to 8 inches of precipitation for the month. A wide band across the southern portion received between 2 and 3 inches while a few scattered areas received between 1 and 2 inches. The excessive precipitation has been most beneficial for water supplies throughout the state.

Cumulative precipitation for the 1986 calendar year thus far is generally above normal in the northern half of the state and below normal in the southern half. The average for the state as a whole is 32.93 inches, 1.08 inches above normal. Regional averages range from 39.13 inches, 7.63 inches above normal, for the West Central region to 28.06 inches, 6.75 inches below normal, for the South Central region.

This is the first month of the 1987 water year which began Oct. 1, 1986, and ends Sept. 30, 1987. The water year is a common reference period for both surface and ground-water supplies. October is generally considered the beginning of the new recharge season for water supplies. The above normal precipitation in both September and October should help to begin the new recharge season in excellent shape.

PRECIPITATION
OCTOBER 1986



Nov 1986

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NOVEMBER 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

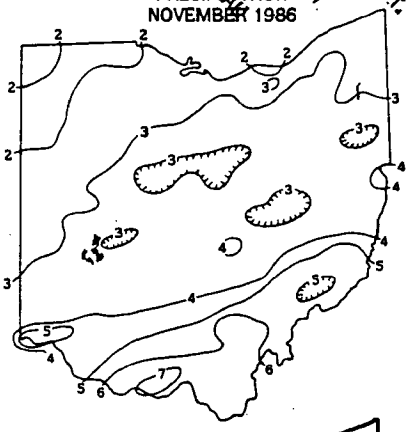
PRECIPITATION for November was above normal throughout most of the state: exceptions were in the Northwest and Northeast regions where it was below normal. This is the third consecutive month in which precipitation has been above normal. The average for the state as a whole was 3.52 inches, 0.78 inch above normal. Regional averages ranged from 5.76 inches, 2.89 inches above normal, for the South Central region to 2.02 inches, 0.54 inch below normal, for the Northwest region. Shawnee State Forest, Scioto County, reported the greatest amount of precipitation for the month, 7.26 inches, and Grover Hill, Pauiding County, reported the least amount, 1.44 inches.

There was precipitation during every week of the month. Greatest amounts fell during the second and fourth weeks in the southern portion of the state, at which time more than one inch fell at many stations. Generally more than two-thirds of the state received between 3 and 6.5 inches of precipitation for the month; the remainder received between 1 and 3 inches. Precipitation was heaviest in the southern portion of the state diminishing to the north. The heavy precipitation in the southern portion was most beneficial to water supplies that had reached critical stages in some cases due to the persistent drought conditions.

Cumulative precipitation for the 1986 calendar year thus far is generally above normal in the northern portion of the state and below normal in the southern portion. The average for the state as a whole is 36.45 inches, 1.86 inches above normal. Regional averages range from 42.17 inches, 8.01 inches above normal, for the West Central region to 32.17 inches, 2.42 inches below normal, for the Northeast Hills region; the South Central and Southeast regions still remain 3.86 and 2.45 inches below normal respectively..

Cumulative precipitation for the first two months of the 1987 water year is above normal throughout the state. The average for the state as a whole is 7.60 inches, 2.55 inches above normal. Regional averages range from 9.54 inches, 4.66 inches above normal, for the West Central region to 5.98 inches, 0.97 inch above normal, for the Northwest region. The new water year is off to a good start with abundant precipitation.

PRECIPITATION
NOVEMBER 1986



Dec 1986

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DECEMBER 1986

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for December was above normal for most of the state. Exceptions were in the Northwest and Southwest regions where precipitation was slightly below normal. The average for the state as a whole was 2.97 inches, 0.52 inch above normal. Regional averages ranged from 3.75 inches, 1.18 inches above normal, for the Southeast region to 1.71 inches, 0.47 inch below normal, for the Northwest region. Shawnee Forest, Scioto County, reported the greatest amount of precipitation for the month, 5.13 inches and Hicksville, Defiance County, reported the least amount, 1.47 inches.

The bulk of the month's precipitation fell in the form of rain during the first week. Small amounts of rain fell during the remainder of the month, including in many cases only traces of snow. Thus, the last three weeks of the month were unusually dry. Snow for this December was sparse: even Chardon, the snow capital of Ohio, reported only 4.5 inches, 20 percent of normal. Generally, most areas of the state received the least amount of snow ever for the month. Generally, the eastern half of the state received 3 to 5 inches of precipitation while the western half received 1.5 to 3 inches. The above normal precipitation during the last week of November and the first week of December was most beneficial to water supplies.

Precipitation for the 1986 calendar year was generally above normal for the northern half of the state and below normal for the southern half. Precipitation for the calendar year averaged 39.42 inches, 2.38 inches above normal. Regional averages ranged from 44.58 inches, 8.06 inches above normal, for the West Central region to 35.43 inches, 1.58 inches below normal, for the Northeast Hills region. Mansfield Airport, Richland County, reported the greatest amount of precipitation for the year, 56.31 inches and North Georgetown, Columbiana County, reported the least amount, 27.37 inches. An isohyetal map and departures from normal appear on the last page of this report.

Precipitation was noticeably below normal throughout the state during the first six months and above normal during the last six months of the year. However, in the southern portion of the state, the above normal precipitation in the latter part of the year was not enough to overcome the noticeable deficiencies of the first six months. Drought conditions persisted late into the fall in the south central and southeastern portions of the state. For the most part, it was a good year for water supplies. Some water problems were experienced in the southeastern portion of the state during the late summer and early fall.

Cumulative precipitation for the first three months of the 1987 water year is above normal throughout the state. The average for the state as a whole is 10.57 inches, 3.07 inches above normal. Regional averages range from 11.95 inches, 4.71 inches above normal, for the

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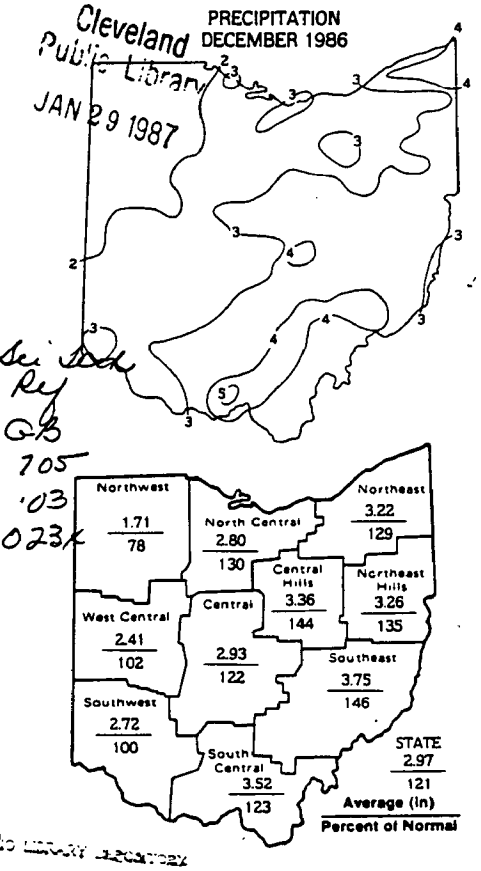

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER

Richard F. Celeste
Governor

Joseph J. Sommer
Director

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JANUARY 1987

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

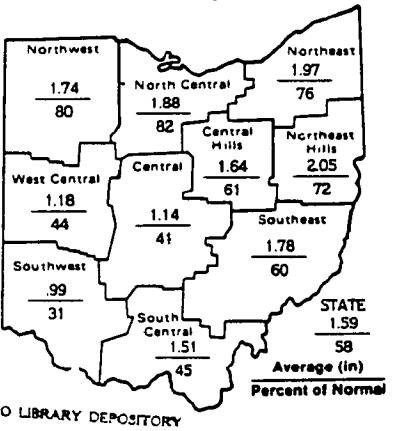
PRECIPITATION for January was noticeably below normal throughout the state. The average for the state as a whole was 1.59 inches, 1.17 inches below normal. Regional averages ranged from 2.05 inches, 0.78 inch below normal for the Northeast Hills region to 0.99 inch, 2.24 inches below normal, for the Southwest region. Chardon, Geauga County, reported the greatest amount of precipitation for the month, 2.72 inches and Milford, Clermont County, reported the least amount, 0.55 inch.

Precipitation was distributed fairly uniform throughout the state. Generally, amounts ranged between 1.5 and 2.5 inches, being lightest in the west, increasing toward the east where a few stations reported more than 2.5 inches. Minimal amounts of rain or snow were observed throughout the state during every week of the month. The only exception was in the northeast when amounts exceeded 1.0 inch on the 2nd and on the 19th when most areas of the state received 0.50 inch or more. As was the case for the past two months, the southeastern portion of the state which experienced drought conditions last year has received the greatest amount of precipitation for the month. Chardon, Geauga County, which reported the greatest amount of precipitation for the month, received 17.5 inches of snow, 6.5 inches below normal. This brings Chardon's snowfall for the 1987 season to 34.0 inches, only 55 percent of normal.

Although January's precipitation appears to be low, it was 0.24 inch more than was received in January 1986. Also, January's precipitation has been lower in 13 of the past 47 years, of which three years reported less than 1.0 inch. Although the deficient precipitation this January has not had a serious effect on the overall water supply situation thus far, it remains to be seen just what will develop during the remaining three months of the 1987 recharge season. It would be wise for those involved in water supplies to monitor their situations closely in the ensuing months and plan accordingly.

Cumulative precipitation for the first four months of the 1987 water year continues to be above normal throughout the state. The average for the state as a whole is 12.16 inches, 1.83 inches above normal. Regional averages range from 13.62 inches, 2.96 inches above normal, for the Southeast region to 9.43 inches, 0.22 inch above normal, for the Northwest region.

PRECIPITATION
JANUARY 1987



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FEBRUARY 1987

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

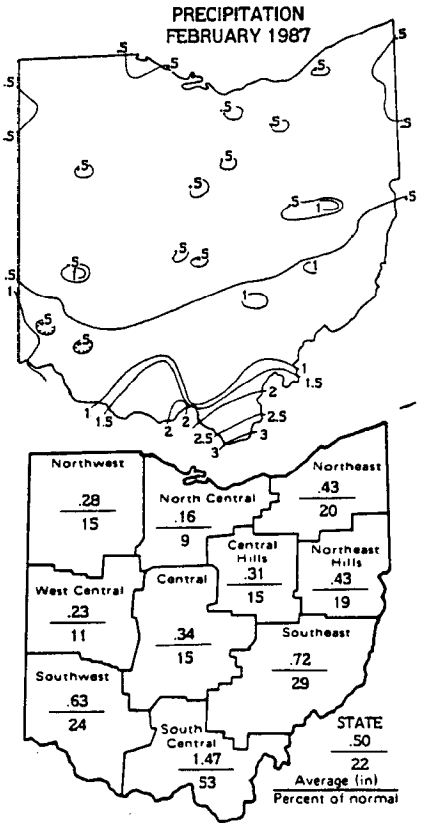
PRECIPITATION for February was noticeably below normal throughout the state. The average for the state as a whole was 0.50 inch, 1.74 inches below normal. Regional averages ranged from 1.47 inches, 1.31 inches below normal for the South Central region to 0.16 inch, 1.71 inches below normal for the North Central region. Departures from normal ranged from 1.31 inches below normal for the South Central region to 1.99 inches below normal for the Southwest region. Waterloo, Lawrence County, reported the greatest amount of precipitation for the month, 2.29 inches, and Grover Hill, Paulding County, reported the least amount—NONE! Also, St. Mary's, Auglaize County, and Montpelier, Williams County, reported only a trace. Note: an area in the extreme southern portion of the state probably received in excess of 3 inches as indicated by the 3.32 inches reported at Huntington Airport NOAA, West Virginia. Chardon, Geauga County, reported 7.3 inches of snow for the month, 36 percent of normal.

Precipitation was light during every week of the month. Stations in extreme south central Ohio and a few isolated stations reported more than 1 inch for the month. Only during storms on the 2nd, 12th, 18th and 28th did stations report more than .02 inch. Much of the precipitation at stations that reported in excess of 1 inch fell on the 28th of the month. Snowfall was extremely light throughout the state during the entire month with only stations in northeastern Ohio receiving significant amounts. This was the second driest February for the state as a whole in 105 years, with only .043 inch in February 1978 being lower. Many stations in northern Ohio reported record low amounts of precipitation for the month.

Cumulative precipitation for the 1987 calendar year thus far for the state as a whole is 2.09 inches, 2.91 inches below normal. Regional averages range from 1.41 inches, 3.37 inches below normal for the West Central region to 2.98 inches, 3.17 inches below normal for the South Central region. Departures from normal range from 2.00 inches below normal for the Northwest region to 4.23 inches below normal for the Southwest region.

Cumulative precipitation for the first five months of the 1987 water year for the state as a whole is 12.66 inches, 0.09 inch above normal. Regional averages range from 9.71 inches, 1.34 inches below normal for the Northwest region to 14.88 inches, 0.76 inch above normal for the South Central region.

Precipitation has been very light since the middle of December 1986. Rainfall during this period is very important for replenishment of ground-water and upground reservoir supplies. It is hoped that current conditions will not persist. Those involved in managing water supplies should monitor their situations closely and plan accordingly.



MARCH '87

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MARCH 1987

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for March was below normal throughout the state except in the Northeast region where it was slightly above normal. The average for the state as a whole was 2.54 inches, 0.84 inch below normal. Regional averages ranged from 3.37 inches, 0.55 inch below normal for the Southwest region to 1.72 inches, 1.15 inches below normal for the Northwest region. Departures from normal ranged from 1.51 inches below normal for the South Central region to 0.23 inch above normal for the Northeast region. Kings Mills, Warren County, reported the greatest amount of precipitation for the month, 4.61 inches, and New Straitsville, Perry County, reported the least amount, 1.11 inches. Chardon, Geauga County, reported 4.60 inches for the month including 22.8 inches of snow which is 121 percent of normal snowfall. For the season, Chardon's total snowfall is 64.2 inches, 64 percent of normal.

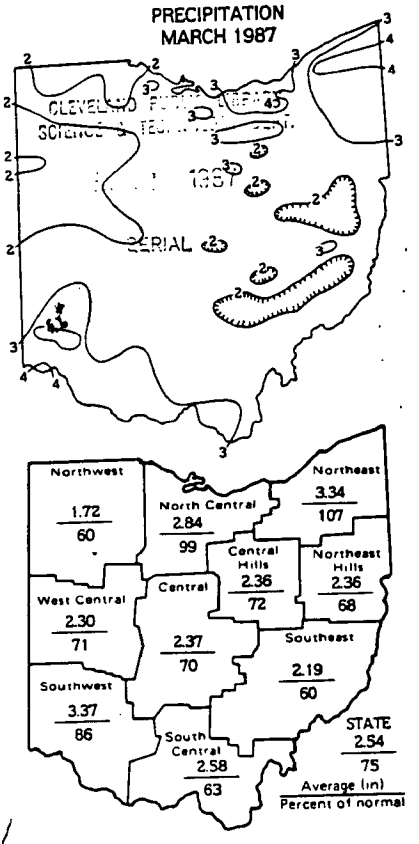
The bulk of the month's precipitation occurred during storm periods on the 1st and 30th-31st. The rest of the month was very dry with amounts of less than 0.50 inch reported on the 14th-15th, 18th-19th, and 24th-25th. The storm on the 30th-31st was the most significant with stations generally reporting from 1 to 2 inches of precipitation. This storm also produced more snow than any other storm this winter for many stations. Most of the state received between 2 and 3 inches of precipitation. Areas in the northeast and southwest portions received more than 3 inches and a few stations more than 4 inches. Stations in the northwest and east central portions received less than 2 inches.

Cumulative precipitation for the 1987 calendar year thus far for the state as a whole is 4.63 inches, 3.75 inches below normal. Regional averages range from 5.74 inches, 2.13 inches below normal for the Northeast region to 3.71 inches, 4.33 inches below normal for the West Central region. Cumulative departures from normal are below normal for all regions ranging from 4.78 inches below normal for the Southwest region to 2.13 inches below normal for the Northeast region. It is significant to note that this was the 4th driest January, February and March for the state as whole in 105 years with only 1941, 1958 and 1983 being drier.

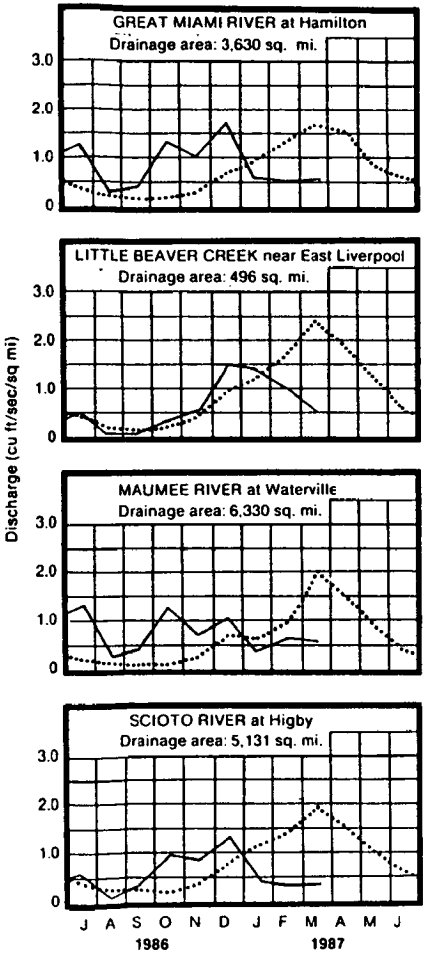
Cumulative precipitation for the first 6 months of the 1987 water year for the state as a whole is 15.20 inches, 0.75 inch below normal. Regional averages range from 17.46 inches, 0.75 inch below normal for the South Central region to 11.43 inches, 2.49 inches below normal for the Northwest region.

This is the third consecutive month that precipitation has been below normal. Although not critical at this time, we urge those involved in managing water supplies to monitor their situations closely and plan accordingly.

PRECIPITATION
MARCH 1987



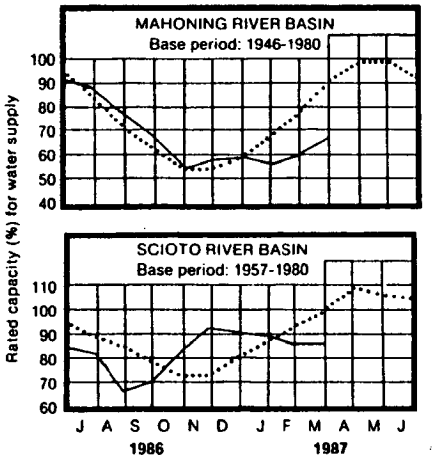
MEAN STREAM DISCHARGE



Base period for all stream: 1951-1980

Normal . . . . . current _____

RESERVOIR STORAGE FOR WATER SUPPLY



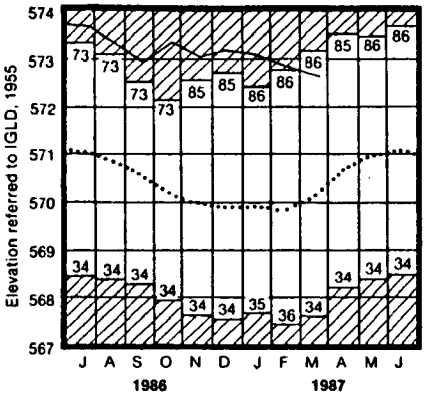
RESERVOIR STORAGE for water supply increased in the Mahoning River basin and was unchanged in the Scioto River basin. Reservoir storage remained below normal in both basins in response to below normal precipitation and runoff for the last three months. Storage has been below normal in the Mahoning River basin for the past three months and in the Scioto River basin for the past two months. Storage in the Mahoning River basin continues to be affected by the draining of Lake Milton for repairs to the dam.

Storage at the month's end for the Mahoning basin index reservoirs was 67 percent of rated capacity for water supply compared to 59 percent for last month and 83 percent for March 1986. Storage at the month's end for the Scioto basin index reservoirs was 85 percent of rated capacity for water supply compared to 85 percent for last month and 101 percent for March 1986.

STREAMFLOW for March was deficient statewide. In general, flows decreased steadily throughout the month after increasing for the first few days in response to the storm on February 28 and March 1. Flows began to increase rapidly on the 30th and 31st in response to the storm of the same dates. Little Beaver Creek recorded the third lowest mean monthly flow for the period of record for March.

Runoff continues to be noticeably below normal throughout the state with amounts ranging from 21 to 37 percent of normal for March. Cumulative runoff for the 1987 calendar year is also noticeably below normal. Cumulative runoff in inches per square mile and percent of normal for the first three months of the 1987 calendar year are: Great Miami River, 1.71 inches, 45 percent; Little Beaver Creek, 2.99 inches, 62 percent; Maumee River, 1.64 inches, 46 percent; and Scioto River, 1.11 inches, 28 percent.

LAKE ERIE LEVELS



Mean discharge and percent of normal for the index gaging stations for March were: Great Miami River, 2,264 cfs, 37 percent; Little Beaver Creek, 274 cfs, 23 percent; Maumee River, 3,781 cfs, 30 percent; and Scioto River, 1,863 cfs, 19 percent.

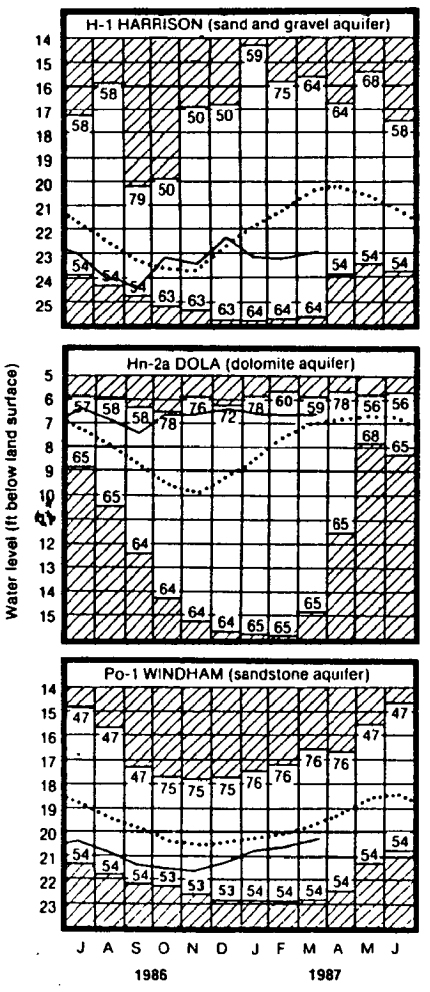
LAKE ERIE level for March declined during the month and did not set a new record high level for the first time since April 1986. Record high levels have been established repeatedly in 17 of the past 23 months. The below normal precipitation for the past three months has resulted in declining lake levels whereas they normally have begun to rise in March.

The mean level for March was 572.69 feet (IGLD-1955), 0.47 foot below the March record high set in 1986, 4.09 feet above Low Water Datum, and 2.64 feet above normal.

GROUND-WATER LEVELS for March in general remained stable throughout the month in response to limited recharge. Ground-water levels range from 0.58 foot below to 0.41 foot above last month's levels. Although precipitation was below normal for March, amounts were enough to have a positive effect on the ground-water storage situation. In general, ground-water levels are from 0.50 to 3.50 feet below normal; exceptions are observation wells Fr-10, OSU Farms, Columbus and Hn-2A, Dola, Hardin County, which have been consistently above normal for the past several years.

The below normal precipitation for the past three months has had a noticeable effect on ground-water supplies. Ground-water levels should normally be rising rapidly in March. The storm on March 30 and 31 was beneficial; however, the full effect will not be determined until the end of April. Although the situation is not critical at this time, those who depend on ground-water for supplies should monitor their situations closely and plan accordingly.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979, Hn-2a, 1955-1979, Po-1, 1947-1979

April 1987

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DIVISION OF WATER

APRIL 1987

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for April was generally below normal throughout most of the state for the fourth consecutive month; exceptions were in the eastern and southeastern portions of the state where it was slightly above normal. The average for the state as a whole was 2.92 inches, 0.59 inch below normal. Regional averages ranged from 4.05 inches, 0.31 inch above normal, for the South Central region to 1.54 inches, 1.77 inches below normal, for the Northwest region. Middlebourne, Guernsey County, reported the greatest amount of precipitation for the month, 5.87 inches and Bowling Green, Wood County, reported the least amount, 1.17 inches.

There was precipitation in most areas of the state during every week of the month. The bulk of the month's precipitation fell during the period April 3rd to 5th. During this period a large portion of the state experienced a severe snowstorm which produced record-breaking amounts of snow for a 24 hour period for many stations in the central and eastern areas of the state, and in many cases it was an all-time record 24 hour snowfall. Columbus reported 12.6 inches; Akron-Canton Airport, 20.6 inches; Chardon, 18 inches; New Philadelphia, 17 inches; Dillon Reservoir at Zanesville, 18 inches; these were all time records for a 24 hour period for these stations. The moisture from this storm along with precipitation throughout the month was beneficial to our water supplies.

Most of the state west of a line from Cincinnati to Cleveland received between 1.5 and 2.5 inches of precipitation for the month while east of ths line precipitation amounts ranged from 2.5 to 3.5 inches, with a few stations reporting in excess of 4 inches and only one station reporting more than 5 inches. Generally, snowfall this winter was much below normal; Chardon, the snow capital of Ohio, reported 82.6 inches, 78 percent of normal.

Cumulative precipitation for the 1987 calendar year remains markedly below normal throughout the state. For most regions, precipitation has been below normal for every month in this calendar year. The average for the state as a whole is 7.55 inches, 4.34 inches below normal. Regional averages range from 9.61 inches, 4.37 inches below normal, for the South Central region to 5.28 inches, 4.92 inches below normal, for the Northwest region. Departures from normal range from 6.06 inches below normal, for the Central region to 2.36 inches below normal for the Northeast region.

Cumulative precipitation for the first 7 months of the 1987 water year remains below normal throughout most of the state; one exception is the North Central region where it is normal. The average for the state as a whole is 18.12 inches, 1.34 inches below normal. Regional averages range from 21.51 inches, 0.44 inch below normal, for the South Central region to 12.97 inches, 4.26 inches below

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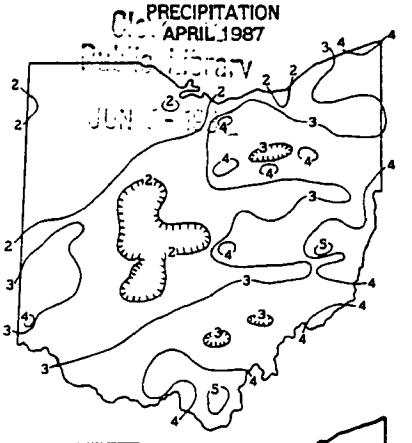
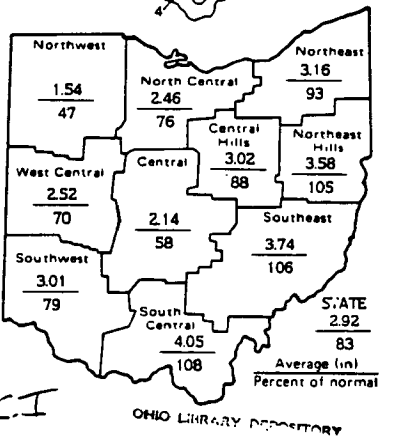
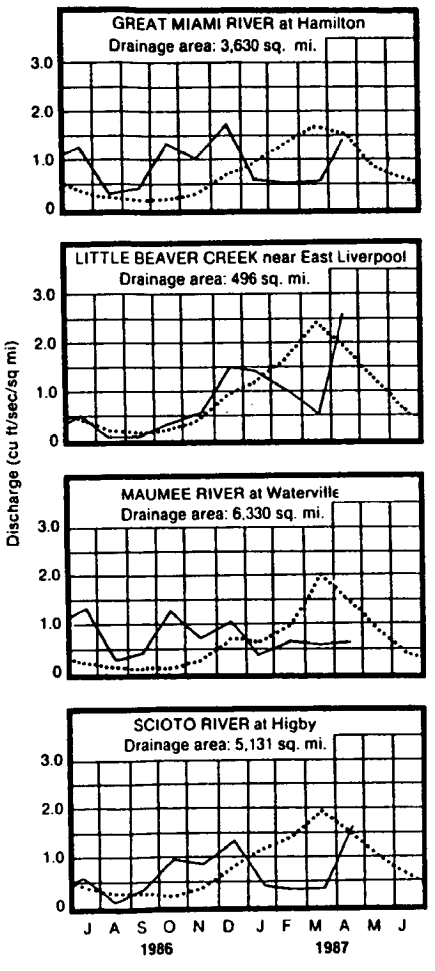
PRECIPITATION
APRIL 1987





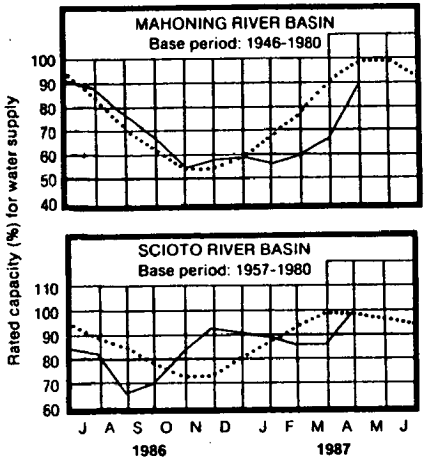
MEAN STREAM DISCHARGE



Base period for all stream: 1951-1980

Normal . . . . . current ———

RESERVOIR STORAGE FOR WATER SUPPLY



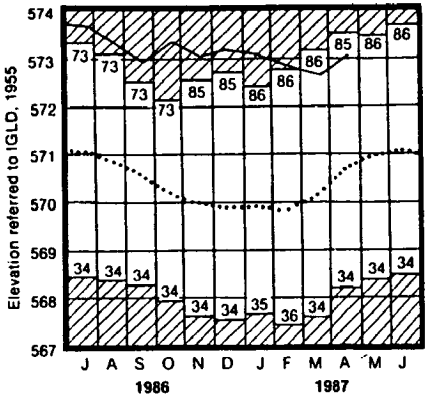
RESERVOIR STORAGE for water supply increased significantly in both the Mahoning River and the Scioto River basins. Storage remained slightly below normal in the Mahoning River basin while it was slightly above normal in the Scioto River basin. Storage at the month's end for the Mahoning basin index reservoirs was 89 percent of rated capacity for water supply compared to 67 percent for last month and 84 percent for April 1986. Storage at the month's end for the Scioto basin index reservoirs was 99 percent of rated capacity for water supply compared to 85 percent for last month and 96 percent for April 1986.

STREAMFLOW for April was generally normal throughout the state; the only exception was in the northwest where it continues to be deficient. Flows increased significantly in most areas of the state during the first half of the month in response to the increased runoff from snow melt and rain during the last two days of March and the first few days of April. An exception to this was in the northwest where streamflow continued to be noticeably deficient in response to below normal precipitation. Flows at the month's end were generally deficient for most areas of the state. Although there was some precipitation throughout the state during the second half of the month, most of it was lost to evaporation, evapotranspiration and soil moisture.

Mean discharge and percent of normal at the index gaging stations were: Great Miami River, 5,205 cfs, 93 percent; Little Beaver Creek, 1,291 cfs, 141 percent; Maumee River, 4,080 cfs, 43 percent; Scioto River, 7,883 cfs, 106 percent.

LAKE ERIE level at Cleveland for April rose during the month following a declining trend in both February and March. This is the second consecutive month the lake level has not set a new record high. The mean level for April was 573.01 feet (IGLD-1955), 0.32 foot above last month's mean level, 0.35 foot below the level observed for April 1986 and 4.41 feet above Low Water Datum.

LAKE ERIE LEVELS



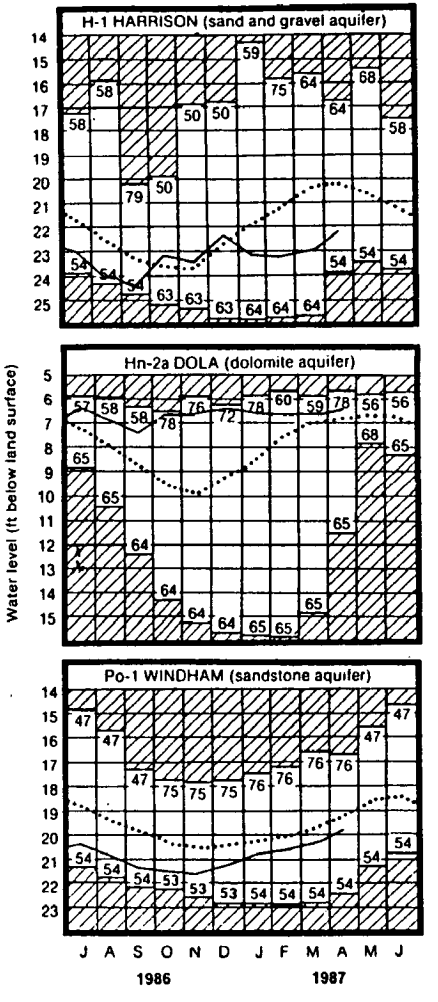
GROUND-WATER LEVELS for April generally showed rises in response to recharge from substantial amounts of precipitation during the last days of March and the first week of April. All the index wells showed net rises from last month's levels ranging from 0.1 foot to 0.9 foot. Ground-water levels were below those levels observed last year in most index observation wells; one exception was in northeast Ohio at Windham, where observation well Po-1, representing a consolidated aquifer, was noticeably above the level observed last year. Water levels are noticeably below normal in most areas of the state; the only exception is in consolidated aquifers in the northwest where water levels continue to be above normal in response to above normal precipitation during the past two or three years. Observation well Tu-1 at Strasburg, Tuscarawas County, set a new record low water level for April for the period beginning in 1962.

Ground-water storage showed some improvement over last month, but still continues to be dangerously low as far as water supplies are concerned. Unless we experience substantially greater than normal precipitation in May, the normal recharge season will have ended, and water levels will begin their usual summer declines.

SUMMARY

Precipitation for April was below normal throughout the state for the fourth consecutive month. Streamflow, reservoir storage and ground-water storage improved slightly in response to precipitation during the first week of the month. Lake Erie level declined slightly and was about 0.5 foot below the record high for April. The water supply situation holds some degree of uncertainty at this time.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979. Hn-2a, 1955-1979. Po-1, 1947-1979

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MAY 1987

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

PRECIPITATION for May was noticeably below normal throughout most of the state; exceptions were in the Central and Central Hills regions where it was above normal for the first time this year. This is the fifth consecutive month for which precipitation has been below normal this year. The average for the state as a whole was 3.34 inches, 0.41 inch below normal. Regional averages range from 4.94 inches, 1.13 inches above normal, for the Central region to 2.27 inches, 1.26 inches below normal, for the Northeast region. Marion, Marion County, reported the greatest amount of precipitation for the month, 8.79 inches: West Manchester, Preble County, reported 7.69 inches and Mt. Gilead, Morrow County, reported 7.27 inches; Ashtabula, Ashtabula County, reported the least amount, 1.10 inches.

There were small amounts of precipitation during every week of the month in most areas of the state. However, the bulk of the month's precipitation fell during the last week of the month when heavy thunderstorms passed through the state on the 21st, 28th, 30th and 31st. It was reported that 4 inches fell during a one hour period on the 28th at Glendale, a suburb of Cincinnati. A heavy storm on the 21st resulted in serious local flooding and caused extensive damage in an area east of Ironton in Lawrence County. The area was declared a "Disaster Area" by the Federal Government at the request of Governor Celeste.

Generally, there was between 3 and 4 inches of precipitation in most areas of the state. Exceptions were in the northeast where from 1 to 3 inches were reported and in the central portion where between 5 and 7.27 inches were reported.

Cumulative precipitation for the first eight months of the 1987 calendar year remains noticeably below normal throughout the state. The average for the state as a whole is 10.89 inches, 4.75 inches below normal. Regional averages range from 12.75 inches, 5.16 inches below normal, for the South Central region to 8.77 inches, 4.97 inches below normal, for the Northwest region. Departures from normal range from 6.42 inches below normal for the West Central region to 3.16 inches below normal for the North Central region. The much below normal precipitation during the first five months of this year is beginning to have a noticeable effect on the state's water supply situation. It would be wise for those in charge of water supplies to monitor their situations closely and plan accordingly.

Cumulative precipitation for the first seven months of this 1987 water year continues to be below normal throughout the state. The average for the state as a whole is 21.46 inches, 1.75 inches below normal. Regional averages range from 24.65 inches, 1.23 inches below normal, for the South Central region to 16.46 inches, 4.31

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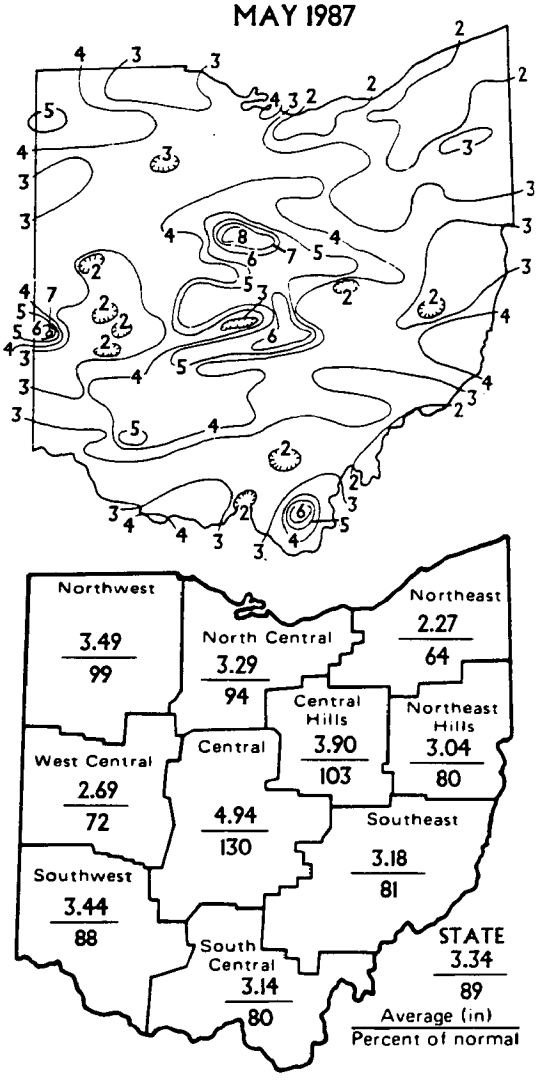
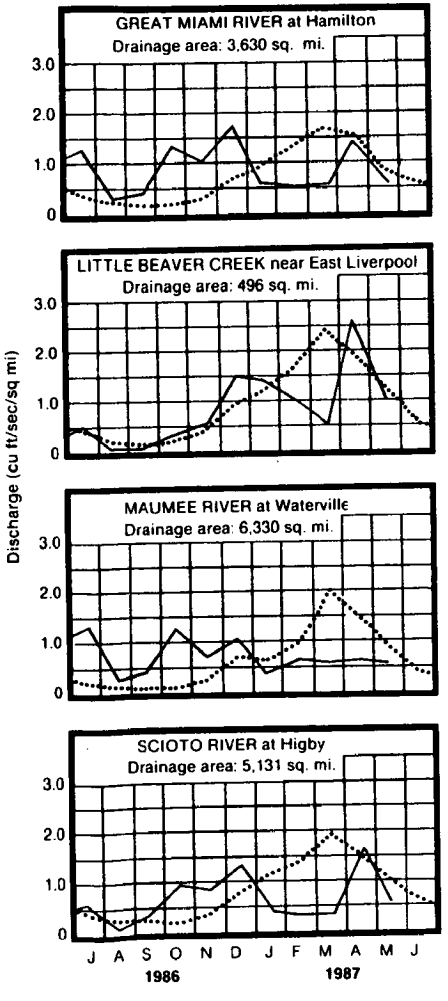
PRECIPITATION
MAY 1987



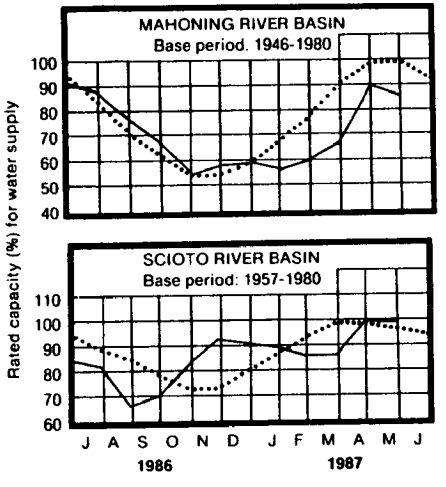
MEAN STREAM DISCHARGE



Base period for all stream: 1951-1980

Normal . . . . . current _____

RESERVOIR STORAGE FOR WATER SUPPLY

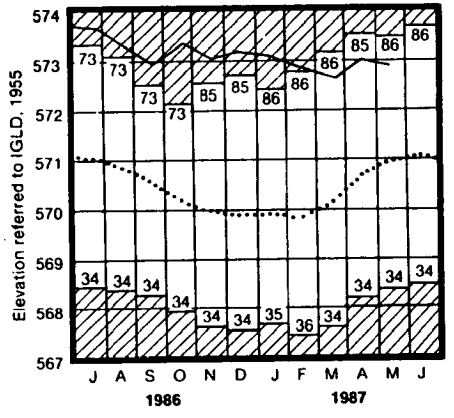


RESERVOIR STORAGE for May declined slightly in the Mahoning River basin and was unchanged in the Scioto River basin. Storage in the Mahoning River basin reservoirs was below normal as has been the case since January; this is due partly to the fact that Milton Reservoir is still drained for repairs. Storage in the Scioto River basin reservoirs is slightly above normal.

Reservoir storage at the month's end for the Mahoning basin index reservoirs was 86 percent of rated capacity for water supply compared to 89 percent for last month and 90 percent for May 1986. Storage at the month's end for the Scioto basin index reservoirs was 99 percent of rated capacity for water supply compared to the same for last month and 89 percent for May 1986.

STREAMFLOW for May showed noticeable declines in most areas of the state as a result of the much below normal precipitation during the first three weeks. Flows were below normal throughout the state for the month; however, flows increased sharply in the central and southern portion of the state in response to the heavy storms during the last week of the month. Mean discharge and percent of normal at the index gaging stations were: Great Miami River, 2,065 cfs, 67 percent; Little Beaver Creek, 489 cfs, 84 percent; Maumee River, 3,724 cfs, 74 percent and Scioto River, 2,934 cfs, 62 percent. Cumulative runoff and departure from normal is: Great Miami River, 9.44 inches, 0.33 inch below normal; Little Beaver Creek, 9.97 inches, 1.53 inches below normal; Maumee River, 6.54 inches, 2.59 inches below normal, and Scioto River, 7.73 inches, 2.14 inches below normal.

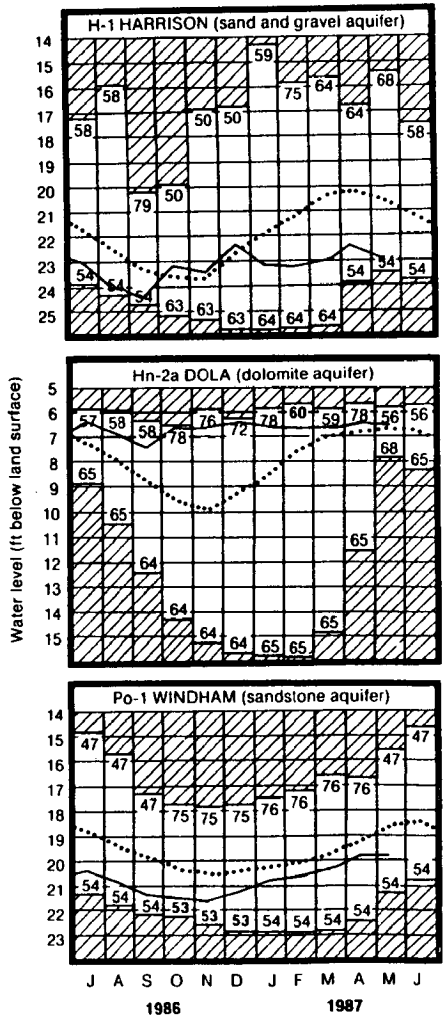
LAKE ERIE LEVELS at Cleveland



LAKE ERIE LEVEL for May at Cleveland declined slightly whereas it usually continues to rise. The mean level for May was 572.87 feet (IGLD-1955), 0.14 foot below last month's mean level, 0.56 foot below the record level observed in May 1986, 1.95 feet above normal and 4.27 feet above Low Water Datum. Note: Lake Erie levels are now reported as the level at Cleveland, Ohio. All means and historical records are based on the long standing record at this location.

GROUND-WATER LEVELS for May generally showed marked declines due to the lack of recharge from the below normal precipitation of the past five months. Wells in the southern portion of the state rose during the last 10 days of the month in response to excess rain from heavy storms in the area. Net declines were generally greater than usual for May; key observation wells representing consolidated aquifers showed net rises in response to delayed recharge. Generally, water levels are noticeably below normal and below those levels observed in May 1986. Some wells in unconsolidated aquifers are near record low levels. These low levels in unconsolidated aquifers pose no immediate threat to water supplies at the present time; however, those depending on ground-water from wells yielding marginal supplies should monitor their wells closely and prepare for alternate supplies.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979. Hn-2a, 1955-1979. Po-1, 1947-1979

ODNR
OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER

Richard F. Celeste
Governor

Joseph J. Sommer
Director

Naturally OHIO the heart of it all!

JUNE 1987

MONTHLY WATER INVENTORY REPORT FOR OHIO

Compiled by Leonard J. Harstine and David H. Cashell

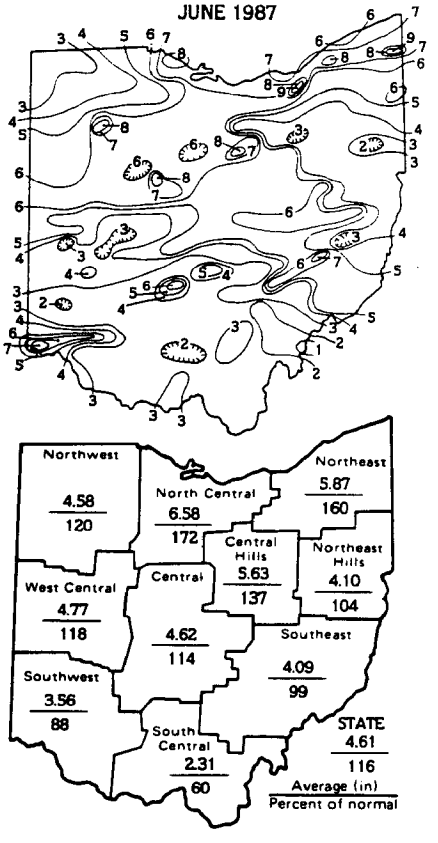
PRECIPITATION for June was above normal for the northern and central portions of the state and below normal for the southern portion. The average for the state as a whole was 4.61 inches, 0.65 inche above normal. This is the first month of the year that precipitation has been above normal for the state as a whole. Regional averages ranged from 6.58 inches, 2.76 inches above normal, for the North Central region to 2.31 inches, 1.57 inches below normal, for the South Central region. Andover, Ashtabula County, reported the greatest amount of precipitation for the month, 9.47 inches: Parma and North Royalton in the Cleveland Metro area also reported 9.31 and 9.23 inches respectively. Belleville Locks and Dam, Meigs County, reported the least amount, 0.76 inch.

Precipitation for the month was produced by scattered thundershowers throughout the state. Moderate to heavy precipitation fell during every week of the month except for the south central and southeast areas where it was mostly moderate to light rains. Some rather heavy storms occurred during the first three days of the month in the northern portion of the state and during the last days in the southwestern portion. Heavy thunderstorms in the north central portion of the state on the 2nd resulted in considerable flooding in the area. Hardin County was the hardest hit with reports of as much as 6 to 7 inches at some locations. Generally, the northern and central portions of the state received between 4 to 9 inches of precipitation and the southern portion received between 1 to 4 inches. These heavy rains helped to relieve the stress on the overall water supply situation which had developed throughout most of the state.

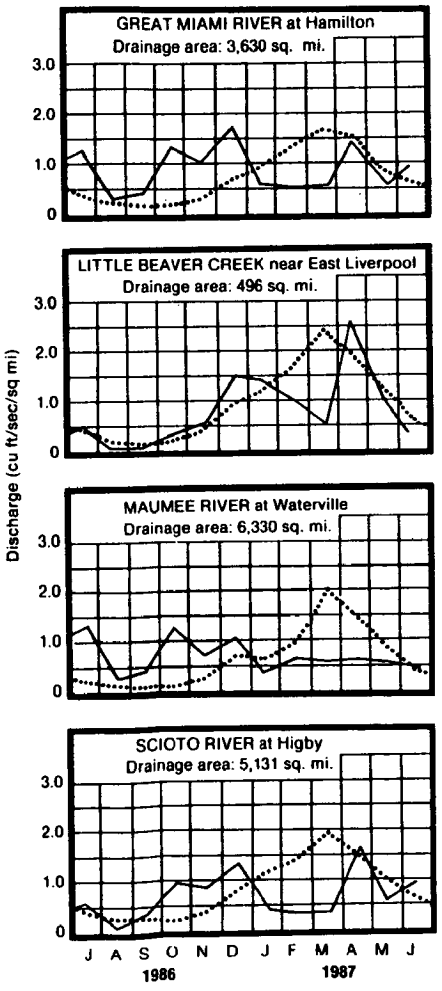
Cumulative precipitation for the first six months of the 1987 calendar year continues to be noticeably below normal. The average for the state as a whole is 15.50 inches, 4.10 inches below normal. Regional averages range from 17.21 inches, 0.40 inch below normal, for the North Central region to 13.35 inches, 4.22 inches below normal, for the Northwest region. Other regions showing sizeable deficiencies are: South Central, 6.73 inches below normal; Southwest, 6.55 inches below normal and West Central, 5.69 inches below normal.

Cumulative precipitation for the 1987 water year remains below normal for most areas of the state; exceptions are in the North Central, Northeast, and Central Hills regions where precipitation is above normal for the first time since January. The average for the state as a whole is 26.07 inches, 1.10 inches below normal. Regional averages range from 27.77 inches, 1.05 inches above normal, for the Central Hills region to 21.04 inches, 3.56 inches below normal, for the Northwest region. Departures from normal range from 2.55 inches above normal for the North Central region to 4.17 inches below normal for the Southwest region.

PRECIPITATION
JUNE 1987



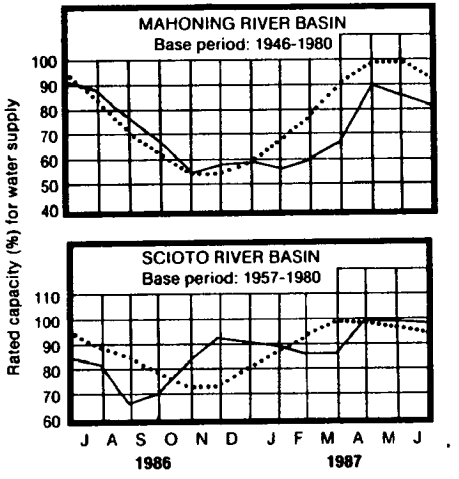
MEAN STREAM DISCHARGE



Base period for all stream: 1951-1980

Normal . . . . . current ———

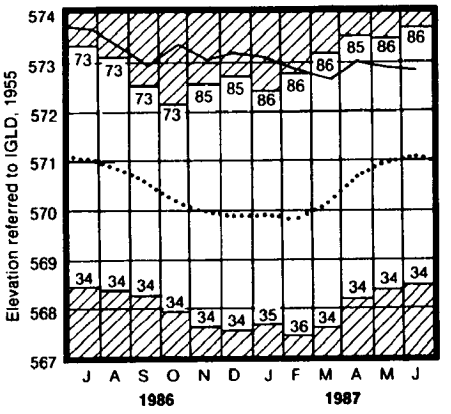
RESERVOIR STORAGE FOR WATER SUPPLY



RESERVOIR STORAGE for water supply for June declined in both the Mahoning River and the Scioto River basins. Storage in the Mahoning River basin continued to be below normal, primarily because Lake Milton is drained for repairs. Storage in the Scioto River basin continues to be slightly above normal. Reservoir storage in general has maintained a good status despite the lack of precipitation during the first few months of this year. Reservoir storage at the month's end for the Mahoning basin index reservoirs was 81 percent of rated capacity for water supply compared to 86 percent for last month and 92 percent for June 1986. Storage at the month's end for the Scioto basin index reservoirs was 98 percent of rated capacity for water supply compared to 99 percent for last month and 84 percent for June 1986.

STREAMFLOW for June was above normal for most of the state; exceptions were in the eastern portion where flows were deficient. A heavy storm on the 2nd, centering on Hardin County, produced severe flooding which caused the loss of one bridge and the temporary closing of many roads. Mean discharge and percent of normal at the index gaging stations were: Great Miami River, 3,341 cfs, 153 percent; Little Beaver Creek, 158 cfs, 53 percent; Maumee River, 3,059 cfs, 139 percent; Scioto River, 4,623 cfs, 153 percent. Streams throughout the state have maintained reasonably good flows despite the fact that runoff has been below normal for every month in this calendar year.

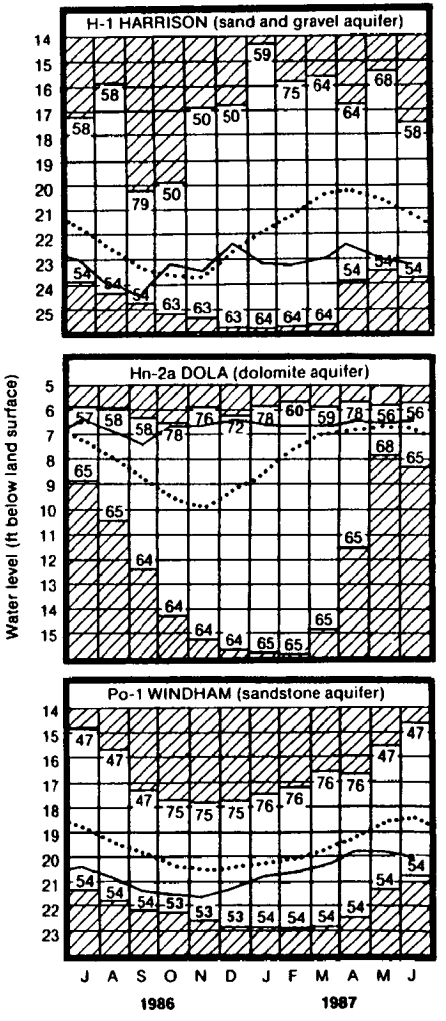
LAKE ERIE LEVELS at Cleveland



LAKE ERIE level for June declined slightly and was nearly one foot below the all time record high set in June 1986. Usually the lake level continues to rise slightly during June. The mean level was 572.78 feet (IGLD 1955), 0.09 foot below last month's mean level, 0.92 foot below the level observed for June 1986, 1.73 feet above normal, and 4.18 feet above Low Water Datum.

GROUND-WATER LEVELS for June showed moderate declines in most areas of the state. Net declines from last month's levels were not nearly as great as usually observed. This indicates that considerable recharge from the above normal precipitation has reached the saturated zone of the aquifers. Generally, water levels were below those levels observed last month in most areas of the state; exceptions were in some consolidated aquifers in the western portion of the state where water levels were slightly higher. Ground-water levels are above those levels observed for June 1986 in consolidated aquifers and below in unconsolidated aquifers. Generally, ground-water levels are noticeably below normal for most areas of the state; exceptions are in consolidated aquifers in the northwestern portion of the state where water levels are slightly above normal. The rains during the last week of May and the first two weeks of June have been most beneficial to water supplies in most areas of the state. At least the water supply situation has not worsened during the first month of the ground-water depletion period. A wet summer would certainly help to alleviate a serious water supply situation for most areas of the state.

GROUND-WATER LEVELS



Base periods: H-1, 1951-1979. Hn-2a, 1955-1979. Po-1, 1947-1979

(2) Provide a list of all wells on the proposed permit and adjacent areas.

See Attachment 14A

(3) Provide a list of all developed springs on the proposed permit and adjacent areas.

See Attachment 14A

(4) Aer there any public water supply sources on the permit and adjacent areas?

__X__ Yes, _____ No. If "Yes", describe the location and type of source and submit Attachment 14.

See Attachment 14D

(5) Submit Attachment 14 for representative wells and developed springs as per 1501:13-4-13(D)(2)(b), (D)(2)(d) and (D)(4).

See Attachment 14A

D. SURFACE WATER INFORMATION

(1) List below the name of the watershed that will receive water discharges from the proposed permit area as listed in the "Gazetteer of Ohio Streams", published by the Ohio Department of Natural Resources.

Captina Creek

(2) List below the location of all surface water bodies such as non-ephemeral streams, lakes and ponds within the proposed permit and adjacent areas.

See Attachment 14D

(3) Submit Attachment 14 for each non-ephemeral stream at the point (downstream) or points (up and downstream) that the stream crosses the permit or adjacent area perimeter.

See Attachment 14A

(4) Based on the quality and quantity measurements listed on Attachment 14 and from other information available to the applicant and submitted with this application, identify the seasonal variations in water quality and quantity for the streams on the proposed permit and adjacent area.

See Attachment 14A's

E. HYDROLOGIC DETERMINATION

Based on the information submitted in response to items B, C, and D in this part of the permit application, submit an addendum describing the probable hydrologic consequences of this proposed mining and reclamation operation, both on and off the mine site, on the hydrologic regime providing information on the quantity and quality of water in surface and ground water systems under seasonal conditions, including the contents of dissolved and total suspended solids, total iron, total manganese, and pH.

See Addendum to Part 2, Page 13, E

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	SP-23	SP-23	W-33	W-33	SP-24	SP-24
2.	Lab Identification Number	8906247	8907062	8906038	8907197	8906299	8907063
3.	High (H)/Low (L) Designation (if applicable)	H	L	H	L	H	L
4.	Surface Elevation for Sampling Station (msl)	1251	1251	1252	1252	1257	1257
* 5.	Depth of Well below Land Surface (feet)	--	--	50	50	--	--
* 6.	Static Water Level of Well below Land Surface (feet)	--	--	16	16	--	--
7.	Flow for Spring/Stream (gpm or cfs)	2	2	--	--	2	2
8.	Date Above Measurements Made	6/12/89	7/6/89	5/31/89	7/12/89	6/12/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-6	L-6	L-2	L-2	L-4	L-4
10.	pH (Standard Units)	6.43	6.57	7.29	7.36	6.54	6.48
11.	Total Acidity (mg/l $CaCO_3$)	29.0	64.0	7.8	13.2	28.0	97.0
12.	Total Alkalinity (mg/l $CaCO_3$)	92.0	92.0	175	189	92.0	95.0
** 13.	Specific Conductivity (umhos/cm at 25°C)	1010	1230	460	500	835	811
** 14.	Total Dissolved Solids (mg/l)	594	681	262	281	469	447
15.	Total Manganese (mg/l)	0.05	0.06	0.4	<0.02	0.03	0.04
16.	Total Sulfates (mg/l)	96.0	80.0	40.0	40.0	54.0	50.0
17.	Total Iron (mg/l)	1.46	0.41	1.74	0.05	0.09	0.06
18.	Total Suspended Solids (mg/l)	101	19.8	5.2	3.8	2.3	4.4
19.	Total Hardness (mg/l as $CaCO_3$)	320	295	68.0	158	170	140
20.	Date Sampled for Analysis	6/12/89	7/6/89	5/31/89	7/12/89	6/12/89	7/6/89
21.	Date Last Precipitation Event Occurred	6/12/89	7/4/89	5/29/89	7/12/89	6/12/89	7/4/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
State: West Virginia Zip: 26003

* NOTE: If information required by items 5, 6, and 9 is unobtainable, submit as an addendum to Attachment 14A a statement giving the reasons why the information is unobtainable.

** NOTE: For each sample provide data for either item 13 or item 14.

1089

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-27	W-27	W-27	W-27	W-27	W-27
2.	Lab Identification Number	8902369	8903416	8904374	8905415	8906423	8907195
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1283	1283	1283	1283	1283	1283
* 5.	Depth of Well below Land Surface (feet)	90	90	90	90	90	90
* 6.	Static Water Level of Well below Land Surface (feet)	32	32	31	31	30	30
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/27/89	3/29/89	4/21/89	5/17/89	6/20/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-6	L-6	L-6	L-6	L-6	L-6
10.	pH (Standard Units)	7.46	7.42	8.10	7.37	7.39	7.53
11.	Total Acidity (mg/l $CaCO_3$)	11.4	8.76	22.3	10.8	22.2	10.0
12.	Total Alkalinity (mg/l $CaCO_3$)	169	160	162	170	165	167
* 13.	Specific Conductivity (umhos/cm at 25°C)	740	740	984	828	1100	900
** 14.	Total Dissolved Solids (mg/l)	383	471	705	608	644	490
15.	Total Manganese (mg/l)	0.03	0.02	0.04	<0.02	0.14	0.05
16.	Total Sulfates (mg/l)	42.0	52.0	41.6	44.8	40.8	35.0
17.	Total Iron (mg/l)	0.07	0.07	0.12	0.08	0.12	0.05
18.	Total Suspended Solids (mg/l)	<1.0	<1.0	<1.0	<1.0	6.3	5.1
19.	Total Hardness (mg/l as $CaCO_3$)	368	422	391	317	442	345
20.	Date Sampled for Analysis	2/27/89	3/29/89	4/21/89	5/17/89	6/20/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/26/89	3/29/89	4/18/89	5/13/89	6/20/89	7/4/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
State: West Virginia Zip: 26003

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-24	W-24	W-24	W-24	W-24	W-24
2.	Lab Identification Number	8902257	8903406	8904258	8905401	8906379	8907075
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1266	1266	1266	1266	1266	1266
* 5.	Depth of Well below Land Surface (feet)	77	77	77	77	77	77
* 6.	Static Water Level of Well below Land Surface (feet)	48	47	47	46	46	46
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/21/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-4	L-4	L-4	L-4	L-4	L-4
10.	pH (Standard Units)	7.04	7.26	7.10	6.87	7.46	7.45
11.	Total Acidity (mg/l $CaCO_3$)	10.4	7.88	12.6	18.6	10.4	6.8
12.	Total Alkalinity (mg/l $CaCO_3$)	76.0	80.9	109	102	148	150
** 13.	Specific Conductivity (umhos/cm at 25°C)	340	350	279	368	430	147
** 14.	Total Dissolved Solids (mg/l)	166	157	169	213	219	202
15.	Total Manganese (mg/l)	0.04	0.02	0.01	0.03	<0.02	<0.02
16.	Total Sulfates (mg/l)	64.0	77.0	74.4	78.4	38.4	28.0
17.	Total Iron (mg/l)	0.15	0.09	0.29	0.10	<0.02	<0.02
18.	Total Suspended Solids (mg/l)	3.6	<1.0	9.0	<1.0	1.30	1.8
19.	Total Hardness (mg/l as $CaCO_3$)	168	129	50.0	62.0	70	90
20.	Date Sampled for Analysis	2/21/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/21/89	3/28/89	4/18/89	5/23/89	6/13/89	7/4/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
State: West Virginia Zip: 26003

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-22	W-22	W-22	W-22	W-22	W-22
2.	Lab Identification Number	8902284	8903393	8904247	8905410	8906387	8907080
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1218	1218	1218	1218	1218	1218
* 5.	Depth of Well below Land Surface (feet)	90	90	90	90	90	90
* 6.	Static Water Level of Well below Land Surface (feet)	42	42	46	44	50	51
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/21/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-2	L-2	L-2	L-2	L-2	L-2
10.	pH (Standard Units)	7.21	7.36	7.28	7.21	7.34	7.33
11.	Total Acidity (mg/l $CaCO_3$)	37.4	14.2	25.4	26.0	30.4	17.0
12.	Total Alkalinity (mg/l $CaCO_3$)	249	267	258	271	257	249
* 13.	Specific Conductivity (umhos/cm at 25°C)	700	670	501	719	810	689
** 14.	Total Dissolved Solids (mg/l)	444	--	399	387	431	379
15.	Total Manganese (mg/l)	0.05	<0.02	<0.02	<0.02	<0.02	<0.02
16.	Total Sulfates (mg/l)	58.0	72.0	61.6	62.4	66	66.0
17.	Total Iron (mg/l)	0.20	0.03	0.03	0.04	0.04	0.03
18.	Total Suspended Solids (mg/l)	7.2	<1.0	1.0	<1.0	3.3	1.8
19.	Total Hardness (mg/l as $CaCO_3$)	300	283	208	187	230	230
20.	Date Sampled for Analysis	2/21/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/21/89	3/28/89	4/18/89	5/23/89	6/19/89	7/4/89

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	SP-11	SP-11	SP-11	SP-11	SP-11	SP-11
2.	Lab Identification Number	8902258	8903400	8904244	8905411	8907032	8907194
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1200	1200	1200	1200	1200	1200
* 5.	Depth of Well below Land Surface (feet)	--	--	--	--	--	--
* 6.	Static Water Level of Well below Land Surface (feet)	--	--	--	--	--	--
7.	Flow for Spring/Stream (gpm or cfs)	2	2	2	2	2	2
8.	Date Above Measurements Made	2/21/89	3/28/89	4/20/89	5/25/89	6/20/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-3	L-3	L-3	L-3	L-3	L-3
10.	pH (Standard Units) 1	7.00	7.14	7.07	7.06	6.95	6.76
11.	Total Acidity (mg/l $CaCO_3$) 2	6.8	13.9	26.2	28.0	26.0	35.2
12.	Total Alkalinity (mg/l $CaCO_3$) 3	65.0	130	133	163	162	174
** 13.	Specific Conductivity (umhos/cm at 25°C) 9	250	360	271	420	384	470
** 14.	Total Dissolved Solids (mg/l)	164	163	219	190	246	223
15.	Total Manganese (mg/l) 5	0.04	<0.02	<0.02	<0.02	<0.02	0.04
16.	Total Sulfates (mg/l) 8	59.0	51.2	58.4	50.4	45.3	49.0
17.	Total Iron (mg/l) 4	0.50	0.15	0.02	0.02	<0.02	0.06
18.	Total Suspended Solids (mg/l) 6	12.8	<1.0	10.0	<1.0	<1.0	5.1
19.	Total Hardness (mg/l as $CaCO_3$) 7	128	159	60.0	91.0	120	127
20.	Date Sampled for Analysis	2/21/89	3/28/89	4/20/89	5/25/89	6/20/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/21/89	3/28/89	4/18/89	5/25/89	6/20/89	7/4/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
State: West Virginia Zip: 26003

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	SP-21	SP-21	SP-21	SP-21	SP-21	SP-21
2.	Lab Identification Number	8902238	8903398	8904248	8905405	8906385	8907068
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1164	1164	1164	1164	1164	1164
* 5.	Depth of Well below Land Surface (feet)	--	--	--	--	--	--
* 6.	Static Water Level of Well below Land Surface (feet)	--	--	--	--	--	--
7.	Flow for Spring/Stream (gpm or cfs)	2	2	2	2	2	2
8.	Date Above Measurements Made	2/20/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-2	L-2	L-2	L-2	L-2	L-2
10.	pH (Standard Units)	7.34	7.36	7.28	7.12	7.10	6.79
11.	Total Acidity (mg/l $CaCO_3$)	12.8	10.8	14.0	24.8	33.0	40.0
12.	Total Alkalinity (mg/l $CaCO_3$)	172	157	142	171	162	174
* 13.	Specific Conductivity (umhos/cm at 25°C)	400	325	256	378	420	452
** 14.	Total Dissolved Solids (mg/l)	199	157	190	197	207	245
15.	Total Manganese (mg/l)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
16.	Total Sulfates (mg/l)	34.0	37.6	36.8	34.4	38.4	36.0
17.	Total Iron (mg/l)	0.04	0.05	0.09	0.08	0.03	0.08
18.	Total Suspended Solids (mg/l)	2.7	2.8	6.0	<1.0	4.5	4.4
19.	Total Hardness (mg/l as $CaCO_3$)	212	174	69.0	72.0	90	145
20.	Date Sampled for Analysis	2/20/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/20/89	3/28/89	4/18/89	5/23/89	6/19/89	7/4/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
State: West Virginia Zip: 26003

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	SP-20	SP-20	SP-20	SP-20	SP-20	SP-20
2.	Lab Identification Number	8902256	8903418	8904253	8905396	8906377	8907074
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1248	1248	1248	1248	1248	1248
* 5.	Depth of Well below Land Surface (feet)	--	--	--	--	--	--
* 6.	Static Water Level of Well below Land Surface (feet)	--	--	--	--	--	--
7.	Flow for Spring/Stream (gpm or cfs)	4	4	4	4	4	4
8.	Date Above Measurements Made	2/21/89	3/29/89	4/20/89	5/24/89	6/19/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-6	L-6	L-6	L-6	L-6	L-6
10.	pH (Standard Units) 1	7.16	7.24	7.27	6.90	7.13	7.09
11.	Total Acidity (mg/l $CaCO_3$) 2	12.6	8.76	21.0	30.0	29.8	29.0
12.	Total Alkalinity (mg/l $CaCO_3$) 3	148	179	208	193	97.6	189
** 13.	Specific Conductivity (umhos/cm at 25°C) 9	470	580	409	654	630	640
** 14.	Total Dissolved Solids (mg/l)	270	246	341	320	357	345
15.	Total Manganese (mg/l) 5	0.02	<0.02	<0.02	0.03	<0.02	<0.02
16.	Total Sulfates (mg/l) 6	65.0	65.0	65.4	67.2	105	64.0
17.	Total Iron (mg/l) 4	0.23	0.07	0.04	0.77	0.02	0.11
18.	Total Suspended Solids (mg/l) 6	6.0	<1.0	4.0	<1.0	<1.0	1.8
19.	Total Hardness (mg/l as $CaCO_3$) 7	236	283	183	192	220	225
20.	Date Sampled for Analysis	2/21/89	3/29/89	4/20/89	5/24/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/21/89	3/29/89	4/18/89	5/23/89	6/19/89	7/4/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
State: West Virginia Zip: 26003

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	SP-12	SP-12	SP-12	SP-12	SP-12	SP-12
2.	Lab Identification Number	8902285	8903394	8904246	8905409	8906388	8907081
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1148	1148	1148	1148	1148	1148
* 5.	Depth of Well below Land Surface (feet)	--	--	--	--	--	--
* 6.	Static Water Level of Well below Land Surface (feet)	--	--	--	--	--	--
7.	Flow for Spring/Stream (gpm or cfs)	0	0	0	0	0	0
8.	Date Above Measurements Made	2/22/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-1	L-1	L-1	L-1	L-1	L-1
10.	pH (Standard Units)	7.63	7.70	7.80	7.46	7.50	7.79
11.	Total Acidity (mg/l $CaCO_3$)	4.8	5.69	6.2	7.2	0.0	5.6
12.	Total Alkalinity (mg/l $CaCO_3$)	106	175	144	151	189	180
13.	Specific Conductivity (umhos/cm at 25°C)	250	380	248	336	430	590
** 14.	Total Dissolved Solids (mg/l)	129	--	207	161	228	226
15.	Total Manganese (mg/l)	0.13	0.15	<0.02	0.07	0.03	0.05
16.	Total Sulfates (mg/l)	20.0	38.4	41.6	28.0	36.0	27.0
17.	Total Iron (mg/l)	5.0	0.27	0.06	0.48	0.25	0.23
18.	Total Suspended Solids (mg/l)	15.6	2.0	2.0	<1.0	3.3	4.4
19.	Total Hardness (mg/l as $CaCO_3$)	140	193	60.0	58.0	110	120
20.	Date Sampled for Analysis	2/22/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/21/89	3/28/89	4/18/89	5/23/89	6/19/89	7/4/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
State: West Virginia Zip: 26003

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-13	W-13	W-13	W-13	W-13	W-13
2.	Lab Identification Number	8902255	8903399	8904245	8905412	8906424	8907070
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1282	1282	1282	1282	1282	1282
* 5.	Depth of Well below Land Surface (feet)	65	65	65	65	65	65
* 6.	Static Water Level of Well below Land Surface (feet)	14	Note 1	Note 1	Note 1	Note 1	Note 1
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/21/89	3/28/89	4/20/89	5/25/89	6/20/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-7	L-7	L-7	L-7	L-7	L-7
10.	pH (Standard Units)	7.31	7.54	7.35	7.31	7.40	7.28
11.	Total Acidity (mg/l $CaCO_3$)	10.4	7.88	14.0	11.2	9.9	10.0
12.	Total Alkalinity (mg/l $CaCO_3$)	204	171	186	188	212	185
** 13.	Specific Conductivity (umhos/cm at 25°C)	0.11	410	367	491	470	541
** 14.	Total Dissolved Solids (mg/l)	252	195	260	228	278	261
15.	Total Manganese (mg/l)	<1.0	<0.02	<0.02	<0.02	<0.02	<0.02
16.	Total Sulfates (mg/l)	283	33.0	33.6	30.4	27.2	27.0
17.	Total Iron (mg/l)	0.3	0.17	0.10	0.16	0.04	0.11
18.	Total Suspended Solids (mg/l)	29.0	<1.0	<1.0	<1.0	5.5	<1.0
19.	Total Hardness (mg/l as $CaCO_3$)	490	218	129	110	45	160
20.	Date Sampled for Analysis	2/21/89	3/28/89	4/20/89	5/25/89	6/20/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/21/89	3/28/89	4/18/89	5/25/89	6/20/89	7/4/89

Laboratory Name Tra-Det, Inc.
Address P.O. Box 2019 City Wheeling
State West Virginia Zip 26003

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NOTE 1: See Addendum to Attachment 14.

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-21	W-21	W-21	W-21	W-21	W-21
2.	Lab Identification Number	8902368	8903419	8905125	8905414	8906425	8907196
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1224	1224	1224	1224	1224	1224
* 5.	Depth of Well below Land Surface (feet)	85	85	85	85	85	85
* 6.	Static Water Level of Well below Land Surface (feet)	Note 3	22	Note 3	Note 3	Note 3	Note 3
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/27/89	3/29/89	4/20/89	5/24/89	6/30/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-3	L-3	L-3	L-3	L-3	L-3
10.	pH (Standard Units)	7.14	7.30	6.97	7.10	7.03	7.14
11.	Total Acidity (mg/l $CaCO_3$)	50.0	20.0	39.4	35.6	48.4	36.8
12.	Total Alkalinity (mg/l $CaCO_3$)	262	289	674	284	273	269
** 13.	Specific Conductivity (umhos/cm at 25°C)	640	670	720	719	710	795
** 14.	Total Dissolved Solids (mg/l)	417	458	500	444	472	478
15.	Total Manganese (mg/l)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
16.	Total Sulfates (mg/l)	80.0	78.0	96.0	72.0	84.8	80.0
17.	Total Iron (mg/l)	0.05	0.06	0.05	<0.02	<0.02	0.03
18.	Total Suspended Solids (mg/l)	<1.0	<1.0	<1.0	<1.0	6.3	4.4
19.	Total Hardness (mg/l as $CaCO_3$)	400	412	330	264	326	367
20.	Date Sampled for Analysis	2/27/89	3/29/89	4/20/89	5/24/89	6/20/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/26/89	3/29/89	4/18/89	5/23/89	6/20/89	7/4/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
State: West Virginia Zip: 26003

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NOTE 3: See Addendum to Attachment 14.

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	SP-23	SP-23	W-33	W-33	SP-24	SP-24
2.	Lab Identification Number	8907062	8910157	8907197	8910160	8907063	8910158
3.	High (H)/Low (L) Designation (if applicable)	H	L	H	L	H	L
4.	Surface Elevation for Sampling Station (msl)	1251	1251	1252	1252	1257	1257
* 5.	Depth of Well below Land Surface (feet)	--	--	50	50	--	--
* 6.	Static Water Level of Well below Land Surface (feet)	--	--	16	16	--	--
7.	Flow for Spring/Stream (gpm or cfs)	2	1.5	--	--	2	1.5
8.	Date Above Measurements Made	7/6/89	10/12/89	7/12/89	10/12/89	7/6/89	10/12/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-6	L-6	L-5	L-5	L-6	L-6
10.	pH (Standard Units)	6.57	6.69	7.36	7.39	6.48	6.71
11.	Total Acidity (mg/l $CaCO_3$)	64.0	28.6	13.2	10.4	97.0	20.3
12.	Total Alkalinity (mg/l $CaCO_3$)	92.0	103	189	168	95.0	115
** 13.	Specific Conductivity (umhos/cm at 25°C)	1230	1190	500	520	811	920
** 14.	Total Dissolved Solids (mg/l)	681	615	281	270	447	477
15.	Total Manganese (mg/l)	0.06	0.07	<0.02	<0.02	0.04	0.04
16.	Total Sulfates (mg/l)	80.0	101	40.0	37.6	50.0	72.0
17.	Total Iron (mg/l)	0.41	0.14	0.05	0.08	0.06	0.03
18.	Total Suspended Solids (mg/l)	19.8	3.7	3.8	1.3	4.4	<1.0
19.	Total Hardness (mg/l as $CaCO_3$)	295	356	158	188	140	240
20.	Date Sampled for Analysis	7/6/89	10/12/89	7/12/89	10/12/89	7/6/89	10/12/89
21.	Date Last Precipitation Event Occurred	7/4/89	10/10/89	7/12/89	10/10/89	7/4/89	10/10/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
State: West Virginia Zip: 26003

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-25	W-25	W-25	W-25	W-25	W-25
2.	Lab Identification Number	8902252	8903409	8904254	8905398	8906374	8907077
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1272	1272	1272	1272	1272	1272
* 5.	Depth of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
* 6.	Static Water Level of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/21/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
10.	pH (Standard Units)	7.48	7.45	7.55	7.19	7.30	7.27
11.	Total Acidity (mg/l $CaCO_3$)	13.2	5.84	7.60	9.2	12	16.0
12.	Total Alkalinity (mg/l $CaCO_3$)	158	140	177	155	108	106
** 13.	Specific Conductivity (umhos/cm at 25°C)	380	340	256	399	410	396
** 14.	Total Dissolved Solids (mg/l)	233	146	151	184	236	217
15.	Total Manganese (mg/l)	0.02	<0.02	<0.02	<0.02	0.03	0.05
16.	Total Sulfates (mg/l)	31.0	35.0	36.8	32.0	74.4	67.0
17.	Total Iron (mg/l)	0.04	0.03	0.04	0.45	0.38	0.06
18.	Total Suspended Solids (mg/l)	<1.0	<1.0	5.0	<1.0	<1.0	<1.0
19.	Total Hardness (mg/l as $CaCO_3$)	188	124	79.0	58.0	85	75.0
20.	Date Sampled for Analysis	2/21/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/21/89	3/28/89	4/18/89	5/23/89	6/19/89	7/4/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-26	W-26	W-26	W-26	W-26	W-26
2.	Lab Identification Number	8902254	8903417	8904255	8905397	8906378	8907079
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1297	1297	1297	1297	1297	1297
* 5.	Depth of Well below Land Surface (feet)	80	80	80	80	80	80
* 6.	Static Water Level of Well below Land Surface (feet)	Note 2	41	45	42	44	43
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/21/89	3/29/89	4/20/89	5/24/89	6/19/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-6	L-6	L-6	L-6	L-6	L-6
10.	pH (Standard Units)	7.25	7.26	7.32	6.98	7.22	7.13
11.	Total Acidity (mg/l $CaCO_3$)	12.4	12.1	15.0	24.2	24.4	23.0
12.	Total Alkalinity (mg/l $CaCO_3$)	167	177	216	205	204	195
* 13.	Specific Conductivity (umhos/cm at 25°C)	500	530	434	654	650	615
** 14.	Total Dissolved Solids (mg/l)	312	255	274	328	317	343
15.	Total Manganese (mg/l)	0.02	<0.02	<0.02	0.02	<0.02	0.02
16.	Total Sulfates (mg/l)	69.0	75.0	68.8	74.4	65.3	82.0
17.	Total Iron (mg/l)	0.20	0.07	0.08	0.71	0.07	0.03
18.	Total Suspended Solids (mg/l)	4.0	<1.0	2.0	<1.0	3.3	3.8
19.	Total Hardness (mg/l as $CaCO_3$)	280	263	193	211	220	255
20.	Date Sampled for Analysis	2/21/89	3/29/89	4/20/89	5/24/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/21/89	3/29/89	4/18/89	5/23/89	6/19/89	7/4/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
State: West Virginia Zip: 26003

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NOTE 2: See Addendum to Attachment 14.

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-31	W-31	W-31	W-31	W-31	W-31
2.	Lab Identification Number	8902240	8903404	8904251	8905407	8906384	8907073
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1270	1270	1270	1270	1270	1270
* 5.	Depth of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
* 6.	Static Water Level of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/20/89	3/28/89	4/20/89	5/25/89	6/19/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
10.	pH (Standard Units)	6.96	7.33	7.17	7.23	7.50	7.33
11.	Total Acidity (mg/l $CaCO_3$)	16.2	11.1	10.6	13.0	16.6	15.0
12.	Total Alkalinity (mg/l $CaCO_3$)	136	167	107	180	229	216
* 13.	Specific Conductivity (umhos/cm at 25°C)	430	440	224	469	560	504
** 14.	Total Dissolved Solids (mg/l)	248	225	143	211	271	261
15.	Total Manganese (mg/l)	0.03	<0.02	0.02	<0.02	<0.02	<0.02
16.	Total Sulfates (mg/l)	50.0	56.0	42.4	44.0	41.3	34.0
17.	Total Iron (mg/l)	0.21	0.13	0.92	0.35	0.03	<0.02
18.	Total Suspended Solids (mg/l)	6.7	<1.0	24.0	<1.0	3.7	6.4
19.	Total Hardness (mg/l as $CaCO_3$)	200	213	20.0	82.0	190	170
20.	Date Sampled for Analysis	2/20/89	3/28/89	4/20/89	5/25/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/20/89	3/28/89	4/18/89	5/25/89	6/19/89	7/4/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
State: West Virginia Zip: 26003

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-41	W-42	W-40	W-39		
2.	Lab Identification Number	NOTE 1	NOTE 1	NOTE 1	NOTE 1		
3.	High (H)/Low (L) Designation (if applicable)						
4.	Surface Elevation for Sampling Station (msl)						
* 5.	Depth of Well below Land Surface (feet)						
* 6.	Static Water Level of Well below Land Surface (feet)						
7.	Flow for Spring/Stream (gpm or cfs)						
8.	Date Above Measurements Made						
* 9.	Aquifer/Zone Identification for Well/Spring						
10.	pH (Standard Units)						
11.	Total Acidity (mg/l $CaCO_3$)						
12.	Total Alkalinity (mg/l $CaCO_3$)						
** 13.	Specific Conductivity (umhos/cm at 25°C)						
** 14.	Total Dissolved Solids (mg/l)						
15.	Total Manganese (mg/l)						
16.	Total Sulfates (mg/l)						
17.	Total Iron (mg/l)						
18.	Total Suspended Solids (mg/l)						
19.	Total Hardness (mg/l as $CaCO_3$)						
20.	Date Sampled for Analysis						
21.	Date Last Precipitation Event Occurred						

Laboratory Name: Tra-Det, Inc.
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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-32	W-32	W-32	W-32	W-32	W-32
2.	Lab Identification Number	8902251	8903405	8904250	8905408	8906383	8907072
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1265	1265	1265	1265	1265	1265
* 5.	Depth of Well below Land Surface (feet)	98	98	98	98	98	98
* 6.	Static Water Level of Well below Land Surface (feet)	30	28	30	27	35	32
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/21/89	3/28/89	4/20/89	5/25/89	6/19/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-5	L-5	L-5	L-5	L-5	L-5
10.	pH (Standard Units)	7.27	7.47	7.35	7.45	7.14	6.93
11.	Total Acidity (mg/l $CaCO_3$)	11.2	8.91	20.8	10.8	25.0	27.0
12.	Total Alkalinity (mg/l $CaCO_3$)	222	209	209	217	109	190
13.	Specific Conductivity (umhos/cm at 25°C)	500	440	348	512	328	553
** 14.	Total Dissolved Solids (mg/l)	258	225	297	242	187	230
15.	Total Manganese (mg/l)	0.04	<0.02	<0.02	<0.02	0.02	0.06
16.	Total Sulfates (mg/l)	40.0	40.0	37.6	36.8	41.6	54.0
17.	Total Iron (mg/l)	0.02	0.03	0.04	0.03	0.72	0.18
18.	Total Suspended Solids (mg/l)	1.6	<1.0	6.0	<1.0	13.3	1.8
19.	Total Hardness (mg/l as $CaCO_3$)	268	238	169	149	46.1	145
20.	Date Sampled for Analysis	2/21/89	3/28/89	4/20/89	5/25/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/21/89	3/28/89	4/18/89	5/25/89	6/19/89	7/4/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
State: West Virginia Zip: 26003

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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-30	W-30	W-30	W-30	W-30	W-30
2.	Lab Identification Number	8902253	8903395	8904252	8905413	8906371	8907071
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1269	1269	1269	1269	1269	1269
* 5.	Depth of Well below Land Surface (feet)	70	70	70	70	70	70
* 6.	Static Water Level of Well below Land Surface (feet)	26	26	27	27	30	29
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/21/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-6	L-6	L-6	L-6	L-6	L-6
10.	pH (Standard Units)	7.36	7.49	7.52	7.28	7.37	7.25
11.	Total Acidity (mg/l $CaCO_3$)	10.2	8.61	13.2	14.8	10.2	14.0
12.	Total Alkalinity (mg/l $CaCO_3$)	207	218	242	206	205	197
** 13.	Specific Conductivity (umhos/cm at 25°C)	560	520	418	589	630	615
** 14.	Total Dissolved Solids (mg/l)	322	283	270	328	331	299
15.	Total Manganese (mg/l)	0.03	<0.02	<0.02	<0.02	<0.02	<0.02
16.	Total Sulfates (mg/l)	45.0	50.0	46.4	51.2	48	43.0
17.	Total Iron (mg/l)	0.05	0.04	0.02	<0.02	0.05	<0.02
18.	Total Suspended Solids (mg/l)	<1.0	<1.0	2.0	<1.0	<1.0	3.1
19.	Total Hardness (mg/l as $CaCO_3$)	146	298	198	187	220	220
20.	Date Sampled for Analysis	2/21/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/21/89	3/28/89	4/18/89	5/23/89	6/19/89	7/4/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	SP-22	SP-22	SP-22	SP-22	SP-22	
2.	Lab Identification Number	8903403	8904242	8905403	8906381	8907065	
3.	High (H)/Low (L) Designation (if applicable)	H	H	H	H	L	
4.	Surface Elevation for Sampling Station (msl)	1250	1250	1250	1250	1250	
* 5.	Depth of Well below Land Surface (feet)	--	--	--	--	--	
* 6.	Static Water Level of Well below Land Surface (feet)	--	--	--	--	--	
7.	Flow for Spring/Stream (gpm or cfs)	1	1	1	1	1	
8.	Date Above Measurements Made	3/28/89	4/20/89	5/25/89	6/19/89	7/6/89	
* 9.	Aquifer/Zone Identification for Well/Spring	L-6	L-6	L-6	L-6	L-6	
10.	pH (Standard Units)	8.08	7.88	7.70	7.61	7.45	
11.	Total Acidity (mg/l $CaCO_3$)	3.07	3.6	3.6	11.6	10.0	
12.	Total Alkalinity (mg/l $CaCO_3$)	88.8	86.4	116	104	132	
** 13.	Specific Conductivity (umhos/cm at 25°C)	410	294	420	450	429	
** 14.	Total Dissolved Solids (mg/l)	156	235	227	258	241	
15.	Total Manganese (mg/l)	0.06	0.11	0.16	1.03	0.74	
16.	Total Sulfates (mg/l)	53.0	53.6	52.0	31.2	34.0	
17.	Total Iron (mg/l)	1.06	1.19	0.62	0.51	2.18	
18.	Total Suspended Solids (mg/l)	39.6	85.0	17.0	14.1	66.4	
19.	Total Hardness (mg/l as $CaCO_3$)	134	30.0	48.0	55	70.0	
20.	Date Sampled for Analysis	3/28/89	4/20/89	5/25/89	6/19/89	7/6/89	
21.	Date Last Precipitation Event Occurred	3/28/89	4/18/89	5/25/89	6/19/89	7/4/89	

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DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-19	W-19	W-19	W-19	W-19	W-19
2.	Lab Identification Number	8902241	8903401	8904243	8905402	8906382	8907066
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1273	1273	1273	1273	1273	1273
* 5.	Depth of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
* 6.	Static Water Level of Well below Land Surface (feet)	30	Note 1	Note 1	Note 1	Note 1	Note 1
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/20/89	3/28/89	4/20/89	5/25/89	6/19/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	L-6	L-6	L-6	L-6	L-6	L-6
10.	pH (Standard Units)	7.70	7.45	7.47	7.32	7.45	7.23
11.	Total Acidity (mg/l $CaCO_3$)	4.8	8.47	7.70	8.4	16.0	8.0
12.	Total Alkalinity (mg/l $CaCO_3$)	117	133	123	155	140	138
* 13.	Specific Conductivity (umhos/cm at 25°C)	370	325	232	368	380	372
** 14.	Total Dissolved Solids (mg/l)	193	147	194	190	206	189
15.	Total Manganese (mg/l)	0.04	<0.02	0.02	0.02	<0.02	<0.02
16.	Total Sulfates (mg/l)	54.0	41.6	38.4	38.4	37.6	36.0
17.	Total Iron (mg/l)	0.13	0.09	0.42	0.44	0.06	0.30
18.	Total Suspended Solids (mg/l)	3.1	<1.0	6.0	<1.0	1.3	3.8
19.	Total Hardness (mg/l as $CaCO_3$)	176	149	30.0	82.0	70	80.0
20.	Date Sampled for Analysis	2/20/89	3/28/89	4/20/89	5/25/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/20/89	3/28/89	4/18/89	5/25/89	6/19/89	7/4/89

Laboratory Name: Tra-Det, Inc.
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OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-28	W-28	W-28	W-28	W-28	W-28
2.	Lab Identification Number	8902370	8903415	8905126	8905445	8906373	
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1299	1299	1299	1299	1299	1299
* 5.	Depth of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
* 6.	Static Water Level of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/27/89	3/29/89	4/20/89	5/24/89	6/19/89	
* 9.	Aquifer/Zone Identification for Well/Spring	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
10.	pH (Standard Units)	7.45	7.36	7.22	7.08	7.27	Note 2
11.	Total Acidity (mg/l $CaCO_3$)	28.8	13.4	24.2	17.2	27.2	
12.	Total Alkalinity (mg/l $CaCO_3$)	266	267	257	272	275	
** 13.	Specific Conductivity (umhos/cm at 25°C)	720	770	740	840	790	
** 14.	Total Dissolved Solids (mg/l)	432	464	441	<10	462	
15.	Total Manganese (mg/l)	<0.02	<0.02	<0.02	0.03	<0.02	
16.	Total Sulfates (mg/l)	74.0	76.0	92.0	70.4	66.7	
17.	Total Iron (mg/l)	0.08	0.11	0.26	0.27	0.10	
18.	Total Suspended Solids (mg/l)	<1.0	2.0	<1.0	4.8	2.1	
19.	Total Hardness (mg/l as $CaCO_3$)	376	432	345	336	395	
20.	Date Sampled for Analysis	2/27/89	3/29/89	4/20/89	5/24/89	6/19/89	
21.	Date Last Precipitation Event Occurred	2/26/89	3/19/89	4/18/89	5/23/89	6/19/89	

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DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-29	W-29	W-29	W-29	W-29	W-29
2.	Lab Identification Number	8902237	8903396	8904249	8905406	8906386	8907069
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1282	1282	1282	1282	1282	1282
* 5.	Depth of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
* 6.	Static Water Level of Well below Land Surface (feet)	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	--
8.	Date Above Measurements Made	2/20/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
10.	pH (Standard Units)	7.11	7.31	7.12	7.16	7.30	7.05
11.	Total Acidity (mg/l $CaCO_3$)	18.4	13.7	34.0	25.8	39.6	30.0
12.	Total Alkalinity (mg/l $CaCO_3$)	261	246	247	257	258	247
* 13.	Specific Conductivity (umhos/cm at 25°C)	800	750	585	773	880	861
** 14.	Total Dissolved Solids (mg/l)	475	475	511	445	513	467
15.	Total Manganese (mg/l)	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
16.	Total Sulfates (mg/l)	91.0	110	92.8	88.0	98.7	108
17.	Total Iron (mg/l)	0.07	0.07	0.11	0.6	0.06	0.03
18.	Total Suspended Solids (mg/l)	1.1	<1.0	1.0	<1.0	3.3	<1.0
19.	Total Hardness (mg/l as $CaCO_3$)	408	407	342	331	380	370
20.	Date Sampled for Analysis	2/20/89	3/28/89	4/20/89	5/24/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/20/89	3/28/89	4/18/89	5/23/89	6/19/89	7/4/89

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ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	W-37	W-35	W-38	W-34	W-34	W-36
2.	Lab Identification Number	8910093	8910092	8910164	8910159	8907064	NOTE 1
3.	High (H)/Low (L) Designation (if applicable)	L	L	L	L	H	
4.	Surface Elevation for Sampling Station (msl)	1235	1210	1270	1272	1272	
* 5.	Depth of Well below Land Surface (feet)	42'	85'	88'	26'	NOTE 1	
* 6.	Static Water Level of Well below Land Surface (feet)	37'	17'	38'	11'	NOTE 1	
7.	Flow for Spring/Stream (gpm or cfs)	--	--	--	--	--	
8.	Date Above Measurements Made	10/8/89	10/8/89	10/13/89	10/12/89	7/6/89	
* 9.	Aquifer/Zone Identification for Well/Spring	L-3	L-3	L-5	L-7	L-7	
10.	pH (Standard Units)	7.35	5.94	7.33	9.40	8.35	
11.	Total Acidity (mg/l $CaCO_3$)	11.8	33.1	17.9	0.0	0.0	
12.	Total Alkalinity (mg/l $CaCO_3$)	176	21.6	236	64.6	115	
** 13.	Specific Conductivity (umhos/cm at 25°C)	520	190	640	570	713	
** 14.	Total Dissolved Solids (mg/l)	298	110	328	294	448	
15.	Total Manganese (mg/l)	<0.02	<0.02	0.05	<0.02	<0.02	
16.	Total Sulfates (mg/l)	46.4	53.6	36.0	141	148	
17.	Total Iron (mg/l)	0.09	0.22	2.80	<0.02	<0.02	
18.	Total Suspended Solids (mg/l)	<1.0	12.5	41.3	2.5	5.1	
19.	Total Hardness (mg/l as $CaCO_3$)	202	8.9	278	121	145	
20.	Date Sampled for Analysis	10/8/89	10/8/89	10/13/89	10/12/89	7/6/89	
21.	Date Last Precipitation Event Occurred	10/6/89	10/6/89	10/10/89	10/10/89	7/4/89	

Laboratory Name Tra-Det, Inc.
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DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	M-12	M-12	M-12	M-12	M-12	M-12
2.	Lab Identification Number	8902242	8903402	8904241	8905404	8906380	8907067
3.	High (H)/Low (L) Designation (if applicable)	--	--	--	--	--	--
4.	Surface Elevation for Sampling Station (msl)	1160	1160	1160	1160	1160	1160
* 5.	Depth of Well below Land Surface (feet)	--	--	--	--	--	--
* 6.	Static Water Level of Well below Land Surface (feet)	--	--	--	--	--	--
7.	Flow for Spring/Stream (gpm or cfs)	2	2	2	2	2	2
8.	Date Above Measurements Made	2/20/89	3/28/89	4/20/89	5/25/89	6/19/89	7/6/89
* 9.	Aquifer/Zone Identification for Well/Spring	--	--	--	--	--	--
10.	pH (Standard Units)	7.41	7.32	7.78	7.97	8.22	7.85
11.	Total Acidity (mg/l $CaCO_3$)	10.4	7.74	4.4	1.6	0.2	10.0
12.	Total Alkalinity (mg/l $CaCO_3$)	79.0	80.9	91.2	107	123	119
** 13.	Specific Conductivity (umhos/cm at 25°C)	480	460	418	491	450	452
** 14.	Total Dissolved Solids (mg/l)	275	36.0	314	161	220	235
15.	Total Manganese (mg/l)	0.39	0.32	0.51	0.42	0.21	1.34
16.	Total Sulfates (mg/l)	50.0	55.0	46.4	36.8	32.8	25.6
17.	Total Iron (mg/l)	4.0	0.92	0.46	0.54	0.92	0.68
18.	Total Suspended Solids (mg/l)	158	119	11.0	<1.0	39.3	9.8
19.	Total Hardness (mg/l as $CaCO_3$)	180	144	50.0	34.0	80	70.0
20.	Date Sampled for Analysis	2/20/89	3/28/89	4/20/89	5/25/89	6/19/89	7/6/89
21.	Date Last Precipitation Event Occurred	2/20/89	3/28/89	4/18/89	5/25/89	6/19/89	7/4/89

Laboratory Name Tra-Det, Inc.
Address P.O. Box 2019 City Wheeling
State West Virginia Zip 26003

* NOTE: If information required by items 5, 6, and 9 is unobtainable, submit as an addendum to Attachment 14A a statement giving the reasons why the information is unobtainable.

** NOTE: For each sample provide data for either item 13 or item 14.

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	M-6	M-7	M-11	M-10	M-9	M-8
2.	Lab Identification Number	8910163	8910073	8910161	8910162	8910089	8910072
3.	High (H)/Low (L) Designation (if applicable)	L	L	L	L	L	L
4.	Surface Elevation for Sampling Station (msl)	1089'	1078'	1152'	1125'	1084'	1042'
* 5.	Depth of Well below Land Surface (feet)	--	--	--	--	--	--
* 6.	Static Water Level of Well below Land Surface (feet)	--	--	--	--	--	--
7.	Flow for Spring/Stream (gpm or cfs)	.45	.32	.27	.51	.09	.39
8.	Date Above Measurements Made	10/13/89	10/5/89	10/13/89	10/13/89	10/8/89	10/5/89
* 9.	Aquifer/Zone Identification for Well/Spring	--	--	--	--	--	--
10.	pH (Standard Units)	7.79	8.03	7.47	7.68	7.78	7.92
11.	Total Acidity (mg/l $CaCO_3$)	3.0	0.0	6.7	6.1	3.0	0.0
12.	Total Alkalinity (mg/l $CaCO_3$)	125	167	134	128	135	150
** 13.	Specific Conductivity (umhos/cm at 25°C)	540	370	370	410	420	410
** 14.	Total Dissolved Solids (mg/l)	270	260	203	219	263	236
15.	Total Manganese (mg/l)	0.06	0.03	1.22	<0.02	0.03	0.04
16.	Total Sulfates (mg/l)	51.2	41.6	50.4	51.3	47.2	44.0
17.	Total Iron (mg/l)	0.63	0.28	6.9	0.10	0.30	0.19
18.	Total Suspended Solids (mg/l)	2.5	4.0	180	6.5	2.1	2.0
19.	Total Hardness (mg/l as $CaCO_3$)	155	141	146	146	153	136
20.	Date Sampled for Analysis	10/13/89	10/5/89	10/13/89	10/13/89	10/8/89	10/5/89
21.	Date Last Precipitation Event Occurred	10/10/89	10/1/89	10/10/89	10/10/89	10/6/89	10/1/89

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
State: West Virginia Zip: 26003

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** NOTE: For each sample provide data for either item 13 or item 14.

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name: The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	U-7	D-7	U-6	D-6	U-4	D-4
2.	Lab Identification Number	8707250	8707247	8707241	8707272	8708277	8707270
3.	High (H)/Low (L) Designation (if applicable)	L	L	L	L	L	L
4.	Surface Elevation for Sampling Station (msl)	984	927	1215	998	1178	1025
* 5.	Depth of Well below Land Surface (feet)	--	--	--	--	--	--
* 6.	Static Water Level of Well below Land Surface (feet)	--	--	--	--	--	--
7.	Flow for Spring/Stream (gpm or cfs)	2 gpm	4 gpm	2 gpm	3 gpm	2 gpm	5 gpm
8.	Date Above Measurements Made	7/8/87	7/8/87	7/8/87	7/13/87	8/13/87	7/13/87
* 9.	Aquifer/Zone Identification for Well/Spring	--	--	--	--	--	--
10.	pH (Standard Units)	7.98	8.21	7.99	8.69	8.20	7.75
11.	Total Acidity (mg/l $CaCO_3$)	5.80	2.60	4.40	0.0	1.0	7.20
12.	Total Alkalinity (mg/l $CaCO_3$)	133	144	164	87.0	144	143
* 13.	Specific Conductivity (umhos/cm at 25°C)	368	360	436	333	410	418
** 14.	Total Dissolved Solids (mg/l)	--	--	--	--	--	--
15.	Total Manganese (mg/l)	<0.02	<0.02	0.03	0.03	<0.02	<0.02
16.	Total Sulfates (mg/l)	54.2	56.3	61.4	46.2	182	51.0
17.	Total Iron (mg/l)	0.11	0.10	0.62	0.86	0.34	0.08
18.	Total Suspended Solids (mg/l)	4.40	4.80	20.4	20.8	10.1	2.0
19.	Total Hardness (mg/l as $CaCO_3$)	234	224	234	162	206	198
20.	Date Sampled for Analysis	7/8/87	7/8/87	7/8/87	7/13/87	8/13/87	7/13/87
21.	Date Last Precipitation Event Occurred	7/7/87	7/7/87	7/7/87	7/13/87	8/9/87	7/13/87

Laboratory Name: Tra-Det, Inc.
Address: P.O. Box 2019 City: Wheeling
State: West Virginia Zip: 26003

* NOTE: If information required by items 5, 6, and 9 is unobtainable, submit as an addendum to Attachment 14A a statement giving the reasons why the information is unobtainable.

** NOTE: For each sample provide data for either item 13 or item 14.

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14A
(HYDROLOGIC MEASUREMENTS AND ANALYSES)

Applicant's Name The Ohio Valley Coal Company

1.	Identification No. of Sampling Station from Hydrology Map	U-7	D-7	U-6	D-6	U-4	D-4
2.	Lab Identification Number	8804208	8804206	8804207	8804204	8712412	8712408
3.	High (H)/Low (L) Designation (if applicable)	H	H	H	H	H	H
4.	Surface Elevation for Sampling Station (msl)	984	927	1215	998	1178	1025
* 5.	Depth of Well below Land Surface (feet)	--	--	--	--	--	--
* 6.	Static Water Level of Well below Land Surface (feet)	--	--	--	--	--	--
7.	Flow for Spring/Stream (gpm or cfs)	4 gpm	8 gpm	3 gpm	5 gpm	4 gpm	7.5 gpm
8.	Date Above Measurements Made	4/4/88	4/4/88	3/30/88	3/30/88	12/16/87	12/16/87
* 9.	Aquifer/Zone Identification for Well/Spring	--	--	--	--	--	--
10.	pH (Standard Units)	8.10	8.20	7.96	8.10	8.41	8.43
11.	Total Acidity (mg/l $CaCO_3$)	4.2	4.8	5.2	26.0	0.00	0.0
12.	Total Alkalinity (mg/l $CaCO_3$)	90	93	109	108	139	139
* 13.	Specific Conductivity (umhos/cm at 25°C)	252	250	280	280	420	410
** 14.	Total Dissolved Solids (mg/l)	--	--	--	--	--	--
15.	Total Manganese (mg/l)	<0.02	<0.02	0.03	<0.02	0.02	<0.02
16.	Total Sulfates (mg/l)	43.0	41.0	42.0	46.0	89.5	85.7
17.	Total Iron (mg/l)	0.07	0.08	0.51	0.27	0.58	0.07
18.	Total Suspended Solids (mg/l)	4.5	5.7	28.5	9.7	21.7	<1.0
19.	Total Hardness (mg/l as $CaCO_3$)	128	132	152	160	201	216
20.	Date Sampled for Analysis	4/4/88	4/4/88	3/30/88	3/30/88	12/16/87	12/16/87
21.	Date Last Precipitation Event Occurred	4/3/88	4/3/88	3/27/88	3/27/88	12/16/87	12/16/87

Laboratory Name Tra-Det, Inc.
Address P.O. Box 2019 City Wheeling
State West Virginia Zip 26003

* NOTE: If information required by items 5, 6, and 9 is unobtainable, submit as an addendum to Attachment 14A a statement giving the reasons why the information is unobtainable.

** NOTE: For each sample provide data for either item 13 or item 14.

ADDENDUM TO ATTACHMENT 14
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

Several developed groundwater sources could not be measured for depth. In some cases, the landowners knew the depth of the well, and these are noted. The reasons why certain wells were not measured included:

Note 1 - The well was covered with dirt, concrete, or a metal hand pump and could not be accessed for measurement. In one case, the Liddle Well (W-13), the well was opened and measured by the owner and re-covered during the sampling period.

Note 2 - The landowner refused to allow sampling or measurement or both.

Note 3 - The landowner was not at home to allow measurements, although bottles were left and filled by the owner. Then the samples were picked up later when left outside the gate or door.

The discharge for spring SP-12 on the Gondira property is listed as 0 gpm. The spring is an old bathtub with a pipe leading into it from a wet zone on the surface. The tub always had water in it even though the pipe was not flowing water. Samples were taken from the tub.

PRECIPITATION RECORD FOR USE WITH YOUR
Taylor 11" CLEAR-VU RAIN GAGE

LOCATION TraDet, Inc.

COUNTY Ohio **STATE** West Virginia

TIME OF OBSERVATION **YEAR** 1989

ADDENDUM TO ATTACHMENT 14A

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Remarks
1	0.00	0.00	0.00	Trace	0.58	0.00	0.00	0.00	0.15	0.27			s - melted snow
2	0.0	1.30[s]	0.00	0.22	0.05	0.00	0.00	0.00	0.00	0.00			
3	0.18[s]	0.27[s]	0.00	0.04	0.00	0.80	0.00	0.00	0.00	0.00			
4	0.01	0.00	0.08	0.26	0.04	0.00	0.78	0.03	0.00	0.00			
5	0.19	0.00	1.16	0.00	0.50	0.36	0.00	0.06	0.00	0.00			
6	0.12	0.00	1.27	0.05	0.16	0.00	0.00	0.51	0.01	0.06			
7	0.18	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00			
8	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.10			
9	0.00	0.00	0.00	0.00	0.66	0.42	0.01	0.00	0.00	0.00			
10	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	Trace	0.29			
11	0.[illegible]	0.00	0.00	0.00	0.14	0.00	0.25	0.00	0.00	0.00			
12	0.21	0.00	0.00	0.03	0.30	0.45	0.12	0.00	0.00	0.00			
13	0.00	0.35	0.00	Trace	0.12	0.35	0.00	0.00	0.00	0.00			
14	0.33	0.37	0.21	0.00	0.00	0.72	0.00	0.00	1.43	0.00			
15	0.00	0.92	0.00	0.00	0.00	0.79	0.00	0.00	0.69	0.00			
16	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.22	0.02			
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.28			
18	0.00	0.00	0.26	0.38	0.00	0.00	0.00	0.15	0.00				
19	0.00	0.00	0.16	0.00	0.00	0.35	0.00	0.08	0.00				
20	0.00	0.70	1.06	0.00	0.04	1.48	0.22	0.00	0.00				
21	0.00	0.18	0.01	0.00	0.23	0.60	0.00	0.00	0.00				
22	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.03	1.31				
23	0.00	0.00	0.06	0.00	0.65	0.00	0.00	0.26	0.30				
24	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00				
25	0.32	0.05	0.00	0.24	0.21	0.10	0.00	0.00	0.00				
26	0.33	0.12	0.00	0.00	0.67	0.85	0.22	0.00	0.00				
27	0.00	0.00	0.04	0.00	0.00	0.00	0.51	0.00	0.00				
28	0.00	0.00	0.68	0.47	0.00	0.00	0.00	0.00	0.00				
29	0.00	-	0.57	0.16	0.03	0.00	0.00	0.56	0.00				
30	0.00	-	0.41	0.00	0.00	0.00	0.03	0.00	0.10				
31	0.00	—	0.34	—	0.00	—	0.00	0.00	—		—		
Total	1.76	3.46	6.39	2.02	5.03	7.42	2.14	1.68	4.13				

SYBRON | Taylor **Total Annual**

TAYLOR INSTRUMENT CONSUMER PRODUCTS DIVISION SYBRON CORPORATION ARDEN NORTH CAROLINA 28704

PRECIPITATION RECORD FOR USE WITH YOUR
Taylor 11" CLEAR-VU RAIN GAGE

LOCATION TraDet Laboratories, Inc.

COUNTY Ohio **STATE** West Virginia

TIME OF OBSERVATION 8:30 AM **YEAR** 1987

ADDENDUM TO ATTACHMENT 14A

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Remarks
1	0.00	0.06	0.42	0.02	0.00	0.22	0.34	0.00	0.00	0.00	0.00	0.10	s - melted sno
2	s 0.31	0.00	0.02	0.20	0.00	0.01	0.20	0.69	0.00	0.25	0.00	s 0.02	
3	s 0.09	0.00	0.00	s 0.53	0.65	0.06	0.00	0.00	0.00	0.10	0.00	0.28	
4	Trace	0.00	0.00	s 0.80	0.02	0.00	0.00	0.06	0.00	0.00	0.02	0.00	
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.34	0.00	0.00	0.00	
6	0.00	0.00	0.00	0.01	0.00	Trace	0.40	0.00	0.02	0.28	0.00	0.00	
7	Trace	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.85	0.06	0.00	0.00	
8	0.00	s 0.09	0.00	0.00	0.00	0.70	0.00	0.00	0.10	Trace	0.12	0.00	
9	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.46	0.00	0.00	0.18	0.14	
10	s 0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	s 0.14	0.00	
11	s 0.01	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.04	0.02	0.00	0.14	
12	0.00	0.22	0.00	0.30	0.00	0.81	0.00	0.00	0.03	0.00	0.00	0.00	
13	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	
14	0.00	0.00	s 0.04	0.10	0.06	0.00	0.03	0.00	0.00	0.00	0.00	0.18	
15	0.02	0.00	0.00	0.12	0.00	0.05	0.23	0.00	0.00	0.00	0.00	0.02	
16	0.02	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	
17	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.20	0.10	0.21	0.02	
18	0.07	0.00	0.00	0.00	1.25	0.00	0.00	0.00	0.12	0.00	0.00	0.00	
19	0.56	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.17	Trace	0.00	0.47	
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.39	
21	0.00	0.00	0.00	0.00	0.00	1.15	0.00	0.06	0.00	0.00	0.00	0.00	
22	s 0.30	0.14	0.00	0.00	0.19	0.28	0.00	2.25	0.15	0.02	0.00	0.13	
23	0.02	0.00	0.00	1.23	0.00	0.00	0.00	0.00	0.00	0.00	Trace	0.00	
24	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	Trace	0.04	0.15	0.11	
25	0.00	0.00	0.56	0.00	0.29	0.12	0.00	0.01	0.00	0.00	0.03	0.41	
26	0.01	0.00	0.00	0.00	0.73	0.00	0.00	0.26	0.00	0.00	0.08	0.02	
27	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.05	0.00	0.26	0.11	Trace	
28	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.90	0.38	
29	s 0.33	–	0.00	0.03	0.00	0.20	0.00	0.03	0.56	0.00	0.35	0.00	
30	s 0.13	–	1.08	0.00	0.00	0.00	0.00	0.00	0.05	0.00	Trace	0.00	
31	0.07	–	0.11	–	0.38	–	0.00	0.21	–	0.00	–	0.19	
Total	2.06	0.77	2.23	4.06	3.61	3.75	1.43	5.35	2.63	1.30	2.29	2.70	

SYBRON | Taylor

Total Annual 32.18

TAYLOR INSTRUMENT CONSUMER PRODUCTS DIVISION/SYBRON CORPORATION/ARDEN, NORTH CAROLINA 28704

PRECIPITATION RECORD FOR USE WITH YOUR
Taylor 11" CLEAR-VU RAIN GAGE

LOCATION TraDet Laboratories, Inc.

COUNTY Ohio **STATE** West Virginia

TIME OF OBSERVATION **YEAR** 1988

ADDENDUM TO ATTACHMENT 14A

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Remarks
1	0.00	1.87	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	Trace	s - melted snow
2	0.00	0.77	0.07	0.03	0.00	0.14	0.00	0.00	0.00	0.02	0.01	0.00	
3	s0.10	0.00	0.33	0.77	0.00	0.14	0.00	0.00	0.50	0.00	0.23	0.00	
4	0.00	s0.01	0.39	0.00	0.14	0.00	0.00	0.00	0.15	0.02	0.01	0.03	
5	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.05	0.00	0.57	0.00	
6	0.01	0.00	0.00	0.17	0.00	0.00	0.00	0.33	0.00	0.00	0.20	0.00	
7	0.04	s0.01	0.00	0.14	0.00	0.00	0.00	0.14	0.00	0.02	0.00	Trace	
8	0.03	0.00	Trace	0.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	
9	0.00	0.00	0.05	0.00	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
10	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.08	0.01	
11	0.00	s0.03	0.00	0.00	0.15	0.00	Trace	0.02	0.00	0.32	0.00	Trace	
12	s0.01	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.04	
13	s0.01	0.00	sTrace	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	
14	0.00	0.00	sTrace	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
15	0.00	0.01	sTrace	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
16	0.00	Trace	sTrace	0.00	0.00	0.03	0.00	0.00	0.00	Trace	0.17	Trace s	
17	0.23	0.00	0.01	Trace	0.00	0.00	0.00	0.00	0.12	0.37	0.00	0.01 s	
18	0.03	0.00	0.05	0.27	0.66	0.00	1.01	0.95	0.00	0.03	0.02	Trace s	
19	1.01	0.00	0.04	0.00	0.00	0.00	0.13	0.05	0.01	0.01	0.45	0.00	
20	0.00	Trace	0.09	0.00	0.00	0.00	0.00	0.00	0.03	Trace	0.78	0.02	
21	Trace	Trace	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Trace	0.11	
22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.22	
23	0.01	0.08	0.00	0.10	0.00	0.05	0.32	0.76	0.00	0.28	0.00	0.20	
24	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.15	0.00	0.01	
25	0.00	0.02	0.54	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	
26	0.01	0.01	0.26	0.01	0.00	0.00	0.03	0.00	0.00	0.00	Trace	0.30	
27	0.00	Trace	0.01	0.03	0.00	0.00	0.01	0.00	0.00	0.03	0.14	0.03	
28	0.01	0.00	0.00	0.32	0.00	0.00	0.00	0.22	0.00	0.06	0.01	0.47	
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00	
30	0.00	—	Trace	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	
31	0.12	—	0.03	—	0.00	—	0.00	0.00	—	0.00	—	0.00	
Total	1.62	2.91	2.29	1.86	2.71	1.35	2.90	3.95	1.61	1.42	2.62	2.37	

SYBRON | Taylor

Total Annual

ADDENDUM NO. 3
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

SEASONAL VARIATIONS OF WATER QUALITY AND QUANTITY

Surface and groundwater data contained in the Attachment 14 forms included with this permit revision, will indicate the seasonal variances of quality and quantity of the water in this area.

The water wells existing in the area give a fairly representative indication of water bearing zones that can be found in this region. The Probable Hydrologic Consequences of mining gives a detailed description of these characteristics.

Precipitation is, obviously, one of the principal factors influencing water systems. Infiltration of precipitation increases soil moisture and influences groundwater chemical composition. The time required for infiltrating precipitation to reach lower water bearing zones increases with increasing depth. Depending on the morphological structure, character of surface vegetation, and intensity of precipitation the amounts of infiltration also vary greatly. Amounts of infiltration subsequently influences the dissolved solids contents of groundwater which, in most cases, become more dilute during periods of prolonged precipitation. Rainfall data collected at or near the Powhatan No. 6 Mine has been charted on the following page. Annual rainfall for the years 1984 through 1987 are graphed in secession. Superimposed on 1987 data are average monthly rainfall which is derived by averaging each month separately and the mean monthly rainfall which is an average of all twelve months' data. The resultant shaded areas indicates which months would be considered those most likely to receive higher or lower than the mean monthly precipitation amount.

Included with the water data collected by OVCC is water quality and quantity documented by the Ohio EPA and the USGS.

All the data will show that an increased water quantity and a decrease in chemical constituent levels is realized during times of increased precipitation and snow melt of winter and spring seasons; while a decrease in water quantity and increase in chemical constituent levels is realized in dry summer and early autumn seasons.

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14B
(GROUND WATER HYDROLOGY DESCRIPTION)

Applicant's Name The Ohio Valley Coal Company

Aquifer/Zone Identification	Aquifer/Zone Lithology	Aquifer/Zone Thickness	Aquifer/Zone Elev. (msl)	Aquifer/Zone Horizontal Extent	Aquifer/Zone Known Uses	Approx. Rate of Discharge/Usage of Aquifer/Zone (gpm or cfs)
L-1	Shale	14'	1148	Outcrop to Outcrop	Livestock	2-4 gpm
L-2	Limey Shale	9'	1164-1176	Outcrop to Outcrop	Livestock, Domestic	2-4 gpm
L-3	Shale	11'	1193-1202	Outcrop to Outcrop	Livestock, Domestic	2-4 gpm
L-4	Shale	8'	1219	Outcrop to Outcrop	Domestic	2-4 gpm
L-5	Shale	11'	1232-1236	Outcrop to Outcrop	Domestic	2-4 gpm
L-6	Shale	8'	1243-1257	Outcrop to Outcrop	Domestic, Livestock	2-4 gpm

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14B
(GROUND WATER HYDROLOGY DESCRIPTION)

Applicant's Name The Ohio Valley Coal Company

Aquifer/Zone Identification	Aquifer/Zone Lithology	Aquifer/Zone Thickness	Aquifer/Zone Elev. (msl)	Aquifer/Zone Horizontal Extent	Aquifer/Zone Known Uses	Approx. Rate of Discharge/Usage of Aquifer/Zone (gpm or cfs)
L-7	Limey Shale	7'	1267-1272	Outcrop to Outcrop	Domestic	2-4 gpm
L-8	Limestone	12'	1282	Outcrop to Outcrop	Domestic	2-4 gpm
L-9	Shale	6'	1299	Outcrop to Outcrop	Domestic	2-4 gpm

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14C
(WELL/SPRING INVENTORY)

Applicant's Name The Ohio Valley Coal Company

Well/Spring Identification Number	Name of Owner of Well/Spring	Surface Elevation of Well/Spring	Depth of Well in Feet Below Land Surface	Static Water Level of Well in Feet Below Land Surface	Lithology of Supplying Aquifer/ Waterbearing Zone	Known Uses of Well/Spring (if spring give discharge rate)
W-13	Liddle	1282	65'	14'	L-7	Domestic
W-19	Bobick	1273	Unknown	30'	L-5	Domestic
W-31	Riley	1270	Unknown	Unknown	Unknown	Domestic
W-32	Riley	1265	98'	27'-35'	L-5	Domestic
W-30	Caretti	1269	70'	26'-30'	L-6	Domestic
W-29	Perkins	1282	Unknown	Unknown	Unknown	Domestic
W-28	Fankhauser	1299	Unknown	Unknown	Unknown	Domestic
W-27	Ooten	1283	90'	30'-32'	L-6	Domestic
W-33	OVCC	1252	50'	16'	L-5	Domestic
W-26	W & B Ogilbee	1297	80'	41'-45'	L-6	Domestic
W-25	A & M Ogilbee	1272	Unknown	Unknown	Unknown	Domestic/ Agricultural

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14C
(WELL/SPRING INVENTORY)

Applicant's Name The Ohio Valley Coal Company

Well/Spring Identification Number	Name of Owner of Well/Spring	Surface Elevation of Well/Spring	Depth of Well in Feet Below Land Surface	Static Water Level of Well in Feet Below Land Surface	Lithology of Supplying Aquifer/ Waterbearing Zone	Known Uses of Well/Spring (if spring give discharge rate)
W-24	A & M Ogilbee	1266	77'	46'-48'	L-4	Domestic
W-21	Kolence	1224	85'	22'	L-3	Domestic/ Agricultural
W-22	Gondira	1218	90'	42'-50'	L-2	Domestic
SP-11	Liddle	1200	--	--	L-3	Livestock
SP-22	Bobick	1250	--	--	L-6	Livestock
SP-21	Perkins	1164	--	--	L-2	Not Used
SP-23	Otto	1251	--	--	L-6	Livestock
SP-24	Otto	1257	--	--	L-6	Livestock
SP-20	Ogilbee	1148	--	--	L-6	Domestic/ Agricultural
SP-12	Gondira	1148	--	--	L-1	Not Used

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14C
(WELL/SPRING INVENTORY)

Applicant's Name The Ohio Valley Coal Company

Well/Spring Identification Number	Name of Owner of Well/Spring	Surface Elevation of Well/Spring	Depth of Well in Feet Below Land Surface	Static Water Level of Well in Feet Below Land Surface	Lithology of Supplying Aquifer/ Waterbearing Zone	Known Uses of Well/Spring (if spring give discharge rate)
W-35	Liddle	1210	85'	17'	L-3	Unused
W-36	Liddle	1210	Unknown	Unknown	Unknown	Unused
W-37	Glover	1235	42'	37'	L-3	Unused
W-34	Otto	1272	26'	11'	L-7	Domestic
W-41	Ogilbee	1272	Unknown	Unknown	Unknown	Unused
W-42	Ogilbee	1270	Unknown	Unknown	Unknown	Unused
W-40	Ward	1168	Unknown	Unknown	Unknown	Unused
W-38	Riley	1270	88'	38'	L-5	Domestic
W-39	Riley	1280	Unknown	Unknown	Unknown	Unused

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14D
(SURFACE WATER BODIES/PUBLIC WATER SUPPLIES)

Applicant's Name The Ohio Valley Coal Company

Surface Water/ Public Supply Identification #	Type of Surface Water/Public Supply	Name of Owner of Surface Water/ Public Supply	Known Uses of Surface Water/ Public Supply
P-1	Pond on Albert E. & Mary K. Ogilbee Property (North Pond)	Albert E. & Mary K. Ogilbee	Livestock
P-2, M-12	Pond on Paul Bobick, et al. Property	Paul Bobick, et al.	Livestock
S-7	Miller's Run Stream	Nancy E. Sechrest (U-7) Seaway Coal Co. Joseph Gondira (D-7)	Unused
S-8	Tributary to Bend Fork	Albert & Mary K. (P-3) Ogilbee (U-6;U-6A;M-6) Anthony & Joanna J. Kolenc (M-7) Joseph Gondira (D-6)	Livestock Livestock Livestock
S-4	Tributary to Bend Fork	Richard & Vernice Otto (U-4) HR & DJ Perkins (M-11) Albert & Mary K. Ogilbee (M-10)	Livestock Livestock Livestock
S-4		Royce & Betty Liddle (M-9) Anthony & Joanna Kolenc (M-8)	Livestock Livestock
S-4		Robin B. Liddle (D-4) Dexter & Marilyn Blaney	Unused Unused

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF RECLAMATION

ATTACHMENT 14D
(SURFACE WATER BODIES/PUBLIC WATER SUPPLIES)

Applicant's Name The Ohio Valley Coal Company

Surface Water/ Public Supply Identification #	Type of Surface Water/Public Supply	Name of Owner of Surface Water/ Public Supply	Known Uses of Surface Water/ Public Supply
PW-1	Public Water	Royce & Betty Liddle	Domestic
PW-2	Public Water	Eileen Glover	Domestic
PW-3	Public Water	Paul Bobick, et al.	Domestic
PW-4	Public Water	H.R. & D.J. Perkins	Domestic
PW-5	Public Water	Neal Fankhauser	Domestic
PW-6	Public Water	R. & V. Otto	Domestic and Livestock
U-6	Pond on Albert E. & Mary K. Ogilbee Property (South Pond)	Albert E. & Mary K. Ogilbee	Livestock

ADDENDUM TO PART 2, PAGE 13, E
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

HYDROLOGIC DETERMINATION

Based on the information submitted in response to items B, C, and D in Part 2 of this application, the probable hydrologic consequences described in Addendum No. 4 may be expected. Although the overall hydrologic regime will not be affected, individual sources of ground and surface water may be temporarily disrupted. That is, individual wells, springs, or streams may suffer significant water loss. However, this effect is expected to be temporary. Sources that are affected permanently will be replaced by OVCC at its own expense. The quality of the surface and ground water in the proposed mining and adjacent area is not expected to be changed in the long term as a result of the proposed mining activities. Specifically, the levels of pH, iron, manganese, total suspended solids, and total dissolved solids are not expected to vary from their original levels.

However, these parameters may temporarily be changed. If these changes are significant enough to cause the source to be unusable, OVCC will replace the source temporarily (within 24 to 48 hours) and permanently (within 2 years) both at the expense of OVCC.

Some temporary changes to individual ground water and surface water source availability are anticipated. Wells and springs may go dry, streams may flow less, ponds may de-water. However, the effect on sediment yield, acidity, total suspended and dissolved solids, and flooding are expected to be minimal if any.

The effects are expected to change within about two years as the localized water table reaches equilibrium again. On a temporary basis, water will be provided for all developed ground water sources and for surface water sources that are used at OVCC's expense. Ponds and streams with visible cracks that are draining water will be repaired. Permanent replacement supplies will be provided if an individual source is permanently affected. OVCC will bear the entire cost of both temporary and permanent water replacement.

As a result of a squeeze that occurred within the room and pillar portion of this permit, in a small area several wells were dewatered. The wells are being monitored at the present time to determine how long before the water returns and at what level.

No pre-subsidence samples were recorded from the wells. One well has collapsed and will have to be re-drilled, in order to make it useable. Two wells have been covered with dirt and are not available for sampling. One well has water within 25 ft of the surface. Another well that was discolored during the incident now has clear water again. Two years is generally thought to be the amount of time required for the ground water sources to become viable after being dewatered. The incident (squeeze) occurred about two years ago.

F. ALTERNATIVE WATER SUPPLY INFORMATION

(1) Based on the response in item E. (page 13) identify the extent to which the proposed coal mining activities may proximately result in contamination, diminution, or interruption of an underground or surface source of water within the proposed permit or adjacent areas that is used for domestic, agricultural, industrial, or other legitimate use.

See Addendum to Part 2, Page 14, F

(2) If contamination, diminution, or interruption may result, identify the alternative sources of water supply that could be developed to replace the existing sources.

See Addendum to Part 2, Page 14, F

G. CLIMATOLOGICAL INFORMATION

If requested by the Chief, subsequent to the filing of the permit application, submit as an addendum to the permit application, the climatological information required by paragraph (G) of rule 1501:13-4-13 of the Administrative Code.

H. LAND USE INFORMATION

(1) Describe the uses of the land within the permit area existing at the time of the filing of this permit application.

(2) Was the land use described in item H(1) above changed within five years before the anticipated date of beginning this proposed mining operation? _____ Yes, _____ No. If "yes", describe the historic use of the land.

(3) Analyze the capability of the land within the proposed permit area before any mining to support a variety of uses.

ADDENDUM TO PART 2, PAGE 14, F
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

ALTERNATIVE WATER SUPPLY INFORMATION

Adjacent Areas Above Full Recovery Mining

The PHC identified herein indicate a potential for diminution and/or interruption of ground water supplies in areas above and contiguous to full recovery mining operations. However, no contamination of such water supplies is expected.

Notwithstanding its mining rights and without waiving any of its mining rights, where such diminution or interruption results from full recovery mining, The Ohio Valley Coal Company will repair and replace such affected water source(s) in the adjacent area at its own expense in a manner mutually satisfactory to OVCC, the surface owner, and the Division of Reclamation, and to a level sufficient to meet the surface owner's pre-mining requirements will be determined by monitoring information gathered in accordance with the Monitoring Plan.

Past experience indicates that the majority of subsidence (that detectable with surveying equipment) is complete within about 45 days after the longwall passes under the area.

The steps which OVCC would take to repair or replace affected water sources in the adjacent area include:

1. Repair damaged cisterns after OVCC has determined that subsidence is complete;

2. On a site specific basis, redrill existing wells, drill new wells, or connect the surface owner to public water supplies;

3. On a site specific basis, developed springs will be replaced by a farm pond built according to accepted engineering practices, drilling of a new well, or development of another spring in close proximity to the original spring;

4. Repair damaged farm ponds so as to be comparable to their pre-mining conditions;

5. Provide interim water supplies until affected water sources are replaced. Interim supplies may include hauled water or a tap to public water supplies, if available;

6. Such other proven, cost effective, and reasonable techniques as OVCC may now, or in the future, deem appropriate.

It is OVCC's intention to fully bear the cost of both interim and permanent water replacement. If contamination, diminution, or interruption of a property owner's underground or surface water supply used for domestic, agricultural, industrial, or other legitimate use occurs as a proximate result of the mine's operation, the OVCC will undertake within 48 hours the necessary measures to repair or replace such water supply at OVCC's expense and to furnish, at the OVCC's expense, an alternate water supply until repair or replacement is completed or will reimburse the property owner for the reasonable cost of obtaining a water supply from the date of any such contamination, diminution, or interruption until the supply is repaired or replaced. OVCC will provide the affected property owner with no less of an available water supply than the property owner had before mining, based on the pre-mining survey. OVCC will notify the Division of Reclamation immediately after it has been informed of the loss of developed water (ground or surface water) due to its mining activities.

As previously stated, the elevation of alternative water sources is unpredictable until the water system in the area again attains equilibrium after mining. Therefore, the alternative water supplies to be developed will be identified when the need arises. Those supplies may include but not be limited to redevelopment of an existing well, spring, or pond, or replacement of the source with the County Water System. The County Water System has been contacted by OVCC and has assured us that there is capacity to replace each developed source with county water. A letter to that effect is enclosed.

If a property owner believes that his or her underground or surface water supply which is used for domestic, agricultural, industrial, or other legitimate use has been contaminated, diminished, or interrupted as a proximate result of the mine's operation, he or she should notify OVCC by calling (614) 926-1351. OVCC will make a determination of liability no later than sixty (60) days after notification of the contamination, diminution, or interruption of a water supply as a proximate result of the mine's operation.

Work on furnishing a temporary alternate water supply will begin within 48 hours after OVCC learns of the contamination, diminution, or interruption to the domestic, agricultural, industrial, or other legitimate-use water supply proximately caused by the mining operation. OVCC will pay all costs associated with this temporary, alternate water supply. Permanent repair or replacement of an affected water supply shall be completed no later than eighteen (18) months after it has been determined that the supply has been contaminated, diminished, or interrupted as a proximate result of the mine's operation. All costs of repair and/or replacement to provide the affected property owner with no less of an available water supply than the property owner had before mining, based on the pre-mining survey, shall be paid for by OVCC.

In repairing or replacing a property owner's underground or surface water supply used for domestic, agricultural, industrial, or other legitimate use which is damaged as a proximate result of the mine's operation, OVCC's first preference is to repair the affected supply. If that is not feasible, OVCC's second preference is to replace the affected supply with a like supply. For example, a damaged pond, if not repairable, would be replaced with a new pond. If that is not feasible, OVCC will replace the affected supply with a similar supply. For example, a damaged dug well, if not repairable or replaceable with another dug well, would be replaced by a potable-type cistern, a drilled well or a similar supply.

It should be recognized that property sites differ in such elements as geologic and hydrologic composition. Thus, the determination of whether repair of an affected water supply is feasible or whether replacement by a specific type of water supply is feasible must be made on a case-by-case, site specific basis. OVCC, in the past, has always attempted to consult and negotiate with the affected property owner concerning the selection of the type of water replacement and its site. This is done at the request of property owners who prefer this procedure to that of OVCC making unilateral decisions about replacement supplies and sites. OVCC, if requested by the Division, will make these decisions unilaterally.

In some cases, OVCC reaches pre-subsidence agreements with landowners, who are normally represented by counsel and in all cases have full opportunity to consult with counsel or anyone else of their choosing. These agreements, which are typically negotiated by OVCC employees, normally cover all potential property damage claims. In situations where such an agreement is reached, OVCC will comply with the water replacement terms contained in the agreement.

In any situation where OVCC determines that the contamination, diminution, or interruption of a water supply was not proximately caused by the mining operation, based on evidence such as the proximity of the supply to the mining operation, site specific geologic and surface conditions, or climatological conditions, OVCC will provide the Division of Reclamation with notice of its determination and the proof in support of that determination to allow the Division to issue a Chief's Order deciding the issue. This Chief's Order is then appealable in accordance with O.R.C. §1513.13. The landowner's domestic water supply will continue during the time OVCC seeks review of this matter pursuant to O.R.C. §1513.13. If it is determined that contamination, diminution, or interruption of a supply is the proximate result of the mine's operation, OVCC shall bear all costs of furnishing temporary water. OVCC reserves the right to proceed against the landowner to recover costs incurred if it is determined that OVCC is not liable for the contamination, diminution, or interruption of the affected water supply.

The Ohio Valley Coal Company intends to place a line along Ogilbee Road to provide both temporary and permanent water replacement sources. The line will be sized large enough to provide water for both dairy farms and the residents along the road. At this time, it is anticipated that the line will be 4 in. in diameter, capable of delivering the estimated demand of about 400,000 gallons per month. As stated above, other options are also available to provide temporary and permanent water supplies.

ADDENDUM TO PART 2, PAGE 14, F(1)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

DEVELOPED SUPPLIES OF GROUND AND SURFACE WATER THAT MAY BE IMPACTED AS A RESULT OF THE PROPOSED OPERATION

Of the supplies listed in Attachments 14C and 14D, the following are expected to be impacted as a result of the proposed operation:

W-19
W-31
W-32
W-39
W-38
W-30
W-29
W-28
W-27
W-26
W-25
W-24
W-21
W-41
W-42
W-35
W-36
W-37
SP-11
SP-22
SP-21
SP-20
P-1
S-8
S-4

PART 3 RECLAMATION AND OPERATIONS PLANS

A. GENERAL REQUIREMENTS

(1) Describe the type and method of coal mining procedures.

Longwall

(2) Describe the proposed engineering techniques to be used in this mining operation.

See Addendum No. 6.

(3) Anticipated annual production of coal: 1.2 mil tons.

Anticipated total production of coal: 6.3 mil * tons.

* during 5 year permit term.

(4) List the major pieces of equipment to be used for all aspects of the operation.

1-longwall shear
1-stage loader
1-continuous miner
180-shields
180-face conveyors
1-crusher
2-shuttle cars
1-tail piece
1-bolter

(5) Describe the construction, modification, maintenance, and removal (unless to be retained for post mining land use) of the following facilities:

(a) Dams, embankments, and other impoundments (in addition, submit Attachments 20 or 21.)

(b) Overburden and topsoil handling and storage areas and structures.

(c) Coal removal, handling, storage, cleaning and transportation areas and structures.

(d) Spoil, coal processing waste, and non-coal waste removal, handling, storage, transportation, and disposal areas and structures.

ADDENDUM NO. 6

ADDENDUM TO PART 3, ITEM A(2)
THE NACCO MINING COMPANY
POWHATAN NO. 6 MINE
R-0360-2

ENGINEERING AND MINING TECHNIQUES

Powhatan No. 6 Mine utilizes a sequential, orderly and timely exploitation of the coal reserve. The typical sequential timing utilizes the following subsystem classifications:

I - Mains Development
II - Submains Development
III - A) Gate Development
B) Longwall Retreat
IV - A) Butt Entry Development
B) Room Retreat

The subsystems are briefly explained as follows:

I. Mains Development -

This is a series of tunnels (entries) mined in the coal reserve that serve as the vital "lifeline" for the life of the mine. These tunnels vary in number, but generally range in number from six (6) to twelve (12), depending upon the function they are intended to serve. These areas are developed using continuous miners.

The coal pillars outlined by the mining of these tunnels (and strategically placed cross tunnels) are designed in such a manner that they will support a minimum of twice the load of the rock (overburden) over the coal seam.

On each side of a group of the main tunnels, a solid pillar of coal (called a barrier pillar) is left intact to further protect the mains and the overburden.

Therefore, when speaking of the Mains Development Subsystems, approximately 25% of the reserve is recovered.

II. Submains Development -

A submain is a series of tunnels (entries) mined in the coal reserve, intended life of which is ten years. The number of tunnels (entries) mined depends upon the functions the submain is intended to perform; and usually, numbers from six (6) to ten (10). Development of these areas is completed with continuous miners.

The submain coal pillars are designed to support twice the maximum overburden the submain will encounter.

Submains Development - continued

The submains and associated barrier pillars (i.e., large coal pillars on each side of the submain entries, to protect these entries and the overburden) extract approximately 30% of the coal reserve.

III. A) Gate Development -

A series of three or four entries mined in such a manner as to outline a longwall panel of coal. Gate entries extract approximately 40% of the reserve and are designed in such a way as to withstand the ground forces imposed by longwall mining. This development is completed using continuous miners.

B) Longwall Mining -

Utilizing specialized equipment, total extraction of the coal reserve is practiced, and results in subsidence of the surface above the coal that has been extracted.

IV. A) Butt Entry Development -

In locations where coal reserves are relatively small in area or have unusual geometric configurations, butt section mining is practiced. Pillars here are designed to support a 30% greater load than the overburden will impose. These areas are developed and mined using continuous mining methods.

B. Room Mining -

Additional tunnels (rooms) are developed off the butt entries, the work in these areas occurring within less than a two year time span. As with butt entry pillars, room pillars are designed to support at least 30% more load than the maximum overburden will impose. These rooms are developed and mined by continuous mining methods.

(16) Describe the degree to which the reclamation plan is consistent with local physical, environmental, and climatological conditions.

(17) Describe the measures to be used to stabilize and protect all surface areas, including spoil piles, affected by the mining activities.

(18) Describe the plan for minimizing to the extent possible and using the best technology currently available disturbances and adverse impacts of the operation on fish and wildlife and related environmental values and achieving enhancement of such resources where practical.

(19) Describe the plan for leaving an undisturbed natural barrier at the elevation of the lowest coal seam to be mined, or if no barrier is to be left, describe the methods to be used to prevent slides and erosion.

E. RECLAMATION PLAN - PROTECTION OF HYDROLOGIC BALANCE

(1) Describe the measures to be taken during and after the proposed coal mining operations to ensure the protection of:

a) The quality of surface and ground water systems within the proposed permit and adjacent areas from the adverse effects of the proposed coal mining activities.

See Addendum to Part 3, Page 22, E (1)(a, b, c, d)

b) The rights of present users of surface and ground water.

See Addendum to Part 3, Page 22, E(1)(a, b, c, d)

c) The quantity of surface and ground water within the proposed permit and adjacent area from adverse effects of the proposed coal mining activities.

See Addendum to Part 3, Page 22, E(1)(a, b, c, d)

ADDENDUM TO PART 3, PAGE 22,
E(1)(a, b, c, d)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

The quality of the surface and ground water in the proposed mining area is not expected to be changed in the long term as a result of the mining activities. Specifically, the levels of pH, iron, manganese, total suspended solids, and total dissolved solids are not expected to vary from their original levels.

The Ohio Valley Coal Company (OVCC) fully recognizes the rights of surface and ground water users. However, OVCC also realizes that its mining will probably disrupt individual developed sources of the surface and ground water in the area for a period of time. OVCC is committed to providing both interim and permanent replacement water to users of surface and ground water. OVCC will bear the cost of providing both interim and permanent replacement water.

As a result of the mining in the proposed permit area, individual surface and ground water developed sources are expected to be temporarily disrupted to the extent that shallow wells may be de-watered, streams may become dry, and springs may develop at a lower elevation than before. These movements of the saturated zones are somewhat unpredictable, and as such, OVCC cannot protect the quantity in these locations. However, alternative water supplies will be provided for those supplies used by the landowner in similar quantities to pre-mining conditions. Because it cannot be determined at what elevation the water will return, the alternative sources of water cannot be fully described here. However, alternatives include the list shown in Addendum No. 5 to Part 2, F.

ADDENDUM NO. 4

GENERALIZED STRATIGRAPHIC COLUMN

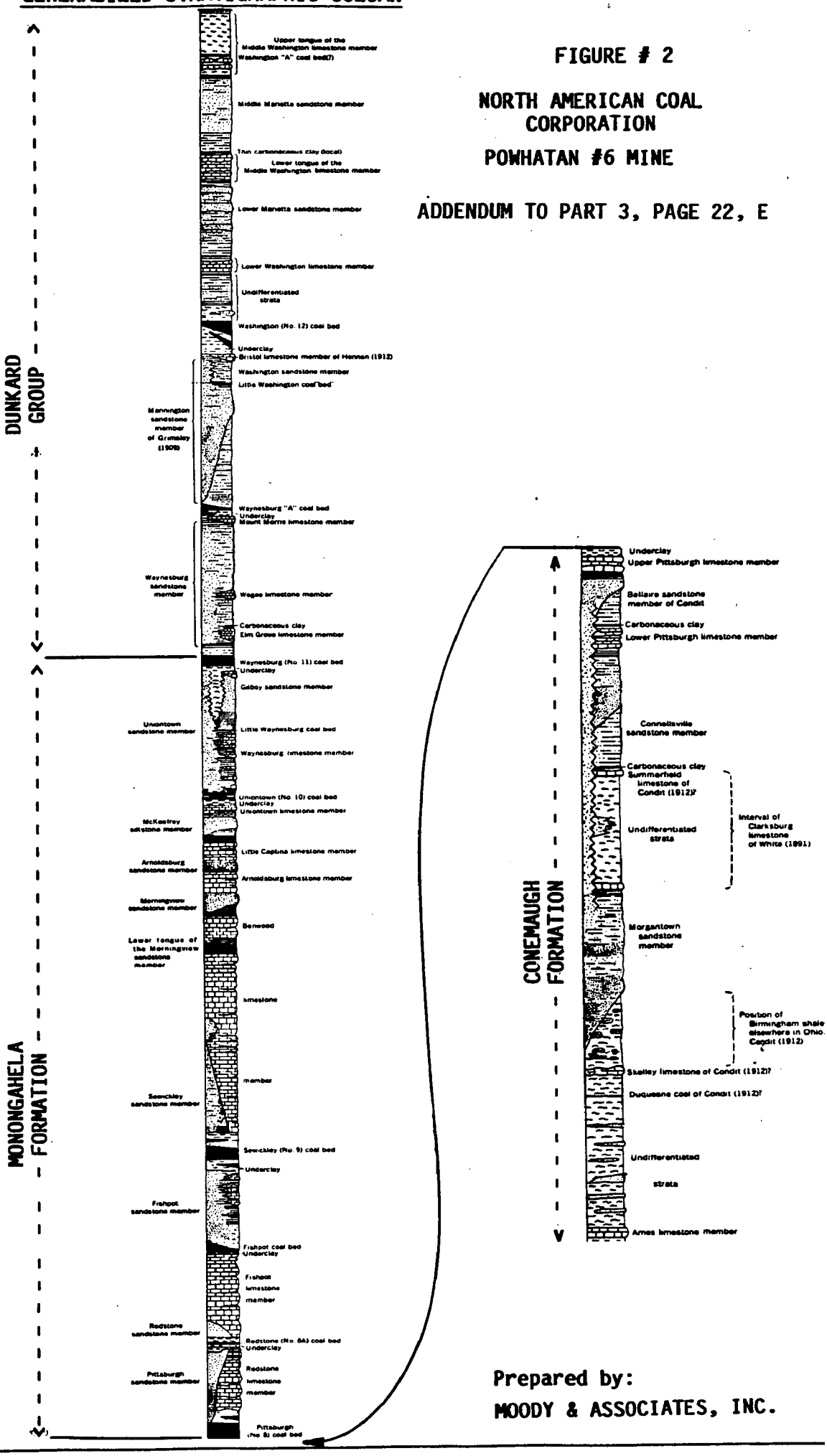

FIGURE # 2

NORTH AMERICAN COAL CORPORATION

POWHATAN #6 MINE

ADDENDUM TO PART 3, PAGE 22, E

From:
U. S. Dept. of Interior
Geological Survey
Professional Paper 380

Prepared by:
MOODY & ASSOCIATES, INC.

HYDROLOGIC DETERMINATION

The following document was prepared by Moody & Associates, Inc., Earth and Water Systems - Consultants of Meadville, Pennsylvania for The Nacco Mining Company.

PROBABLE
HYDROGEOLOGIC CONSEQUENCES
OF LONGWALL MINING OPERATIONS
AT POWHATAN #6 MINE

TOPOGRAPHIC SETTING

The Powhatan #6 Mine is located in Belmont County, Ohio which is within the Appalachian Plateau physiographic province. The topography of the county is typically hilly with broad rounded ridges and deep v-shaped valleys dissecting the terrain. Total topographic relief within the county is approximately 800'. However, within the Mine #6 longwall area, maximum relief is approximately 384'. The elevation varies between 1265' (maximum) above sea level in the northeast portion of the study area and 881' (minimum) in the south-central portion. Figure #1 is a portion of the Hunter and Armstrong Mills, Ohio U.S.G.S. 7½ Minute Topographic maps showing the location of the area of interest.

Drainage within the entire study area occurs to the south through several small steams that are tributaries to Bend Fork. Bend Fork flows to the southeast along the southern boundary of the study area and drains into the Captina Creek which is the main drainage system for the southern portion of Belmont county. Captina Creek flows eastward to the Ohio River with the confluence of the two located at Powhatan Point, Ohio.

GEOLOGIC SETTING

The bedrock units that underlie the study area consist of Permian through Pennsylvanian in Age. The Permian Age rocks consist of Dunkard Group. This sequence covers much of the study area at the surface. Below the Dunkard Group lies the Monongahela and Conemaugh Formations of the Pennsylvanian system. The Monongahela Formation is exposed only in the stream valleys with the underlying Conemaugh Formation not exposed at all. Figure #2 is a generalized stratigraphic column showing the relationship of these bedrock units.

The Monongahela Formation consists of the Pittsburgh #8 coal seam at the base through the Waynesburg #11 coal seam. Other coal seams consist of the Redstone #8A, Fishpot, Sewickley #9 and Uniontown #10 coal seams. Other important members of the formation are the Redstone Limestone the Fishpot Limestone and the Benwood Limestone, all of which are found above the Pittsburgh #8 coal seam. The remaining portion of the Monongahela Formation consists of clay, sandstone and shale.

Above the Waynesburg #11 coal seam, the Dunkard Group consists of coal (Washington #12 seam), limestone, sandstone, shale and clay. The Dunkard Group is found at the cap of the hilltops at elevations above sea level of approximately 950' and above.

Below the Pittsburgh #8 coal seam lies the Conemaugh Formation. The Conemaugh consists of sandstone, siltstone, mudstone, shale, clay and limestone. Much of the formation consists of undifferentiated strata, however, several important members lie relatively close to the Pittsburgh #8 coal seam. These members are the underclay to the Pittsburgh #8 coal seam, the Upper Pittsburgh Limestone, the Bellaire Sandstone and the Lower Pittsburgh Limestone. These units are not tapped as aquifers within the study area at present because adequate aquifers can be found at shallower depths.

Figures #3 and #4 are cross sections running east-west and north-south respectively showing the subsurface relationship of the bedrock units. Structurally, the rock units dip to the southeast at an average of 20 feet per mile. This gentle dip can increase to as much as 70 feet per mile where small flexures increase the dip locally.

HYDROLOGY

Bedrock units within the study area are generally tight and have limited ground water development potential. Domestic well yields are generally less than 5 gallons per minute (gpm) with transmissivities usually less than 1,000 gallons per day per foot. Ground water within the study area occurs under water table, semi-confined and confined conditions. Storage coefficients should range from 10^{-2} to 10^{-6}.

Most valuable ground water supplies developed in rock units are dependent on natural fracturing or secondary porosity and permeability. Primary porosity and permeability is relatively low in the bedrock as it noted by the relatively low yield of domestic wells and the reliance on springs for domestic water supplies. Approximately 50% of the domestic water supplies within the study area rely on springs as the source. Most of these springs are contact springs located along the valley walls where bedrock units of lower permeability and porosity impede downward infiltration of ground water and force water to discharge as springs.

The aquifers within the study area that are tapped for domestic water supplies are regional in extent. The relatively flat-lying orientation of the bedrock and the high topographic relief (i.e. deep v-shaped valleys) of the area, tends to isolate many of the aquifers to small upland areas. Therefore, the aerial extent of the unit is limited and so would be the recharge potential.

Downward migration of ground water is also controlled by naturally occurring fractures. These earth fractures, while not ubiquitous, do occur sporadically, over most of the mine plan area and have an effective depth of less than 200'. Below 200', the fractures may still be present, but are either filled with silts and clays, or have healed due to lithostatic pressures. Therefore, the enhanced permeability of these fractures is regulated and the relatively low primary permeability of the units controls ground water flow at depth. This premise is based on the general limited hydraulic communication with the #6 Mine.

In a study conducted by our office in 1980, the water make of the mine (total water inflow), was calculated to be approximately 42 gallons per day (gpd) per acre mined or 26,880 gpd per square mile. Most sections of the mine were essentially dry and water inflow was generally limited to areas of low cover and stream valleys or fractured zones. Interviews with mine personnel today, indicate the water conditions in the mine have not changed substantially in the last seven years.

In contrast to the mine water make, the ground water recharge potential of the area has been estimated between 100,000 and 250,000 gpd per square mile or 155 to 400 gpd per acre. It thus appears only 10 to 27 percent of the ground water recharge potential is intercepted by the mine. This clearly indicates the majority of the subsurface flow system within the mine plan area is shallow and is unaffected by deep mining.

EFFECTS OF SUBSIDENCE ON GROUND WATER

As discussed in other sections of this application, subsidence will occur as a result of the proposed longwall mining activities. A rubble zone approximately 30 to 50 feet thick above the coal seam is expected. Above the rubble zone, large to very large blocks of bedrock will be present. Interception of ground water moving naturally occurring fractures is expected and some communication with the mine will no doubt occur.

However, overall effects are predicted to be relatively minor with local drainage of aquifers occurring where subsidence induced fractures intercept naturally occurring fractures that contain ground water. In these local areas, water tables may be lowered and interruption of service from domestic wells and springs is possible. The effects are not expected to be wide-spread and even where they occur, the effects are anticipated to be temporary.
In this situation, "temporary" has two different time frames:

#1 - Short-Term

Water levels recovery is a documented phenomenon in similar dewatering situations. The recovery of the water level is most commonly explained by the healing of fractures that are transmitting water downward to lower piezometer head potential of the mine void (i.e. unflooded mine). Fractures are healed in response to several factors.

A - Closure of fractures in response to lithology pressures of the rock sequence.

B - Filling of the fractures with sediments, primarily silt and and clay, carried by downward flowing water.

C - Swelling of clay and claystones as they encountered downward flowing water.

Water level recovery by this mechanism normally occurs within months after mining.

#2 - Long-Term

In the long-term, lowering of the water level is rectified by the elimination of a low head potential in the mine, (i.e. the mine floods). As a head potential increases, (i.e. pool level increases) in the mine void, the ground water flow and level is re-established in the rock sequence above the mine. The level of ground water past mining may not reflect the original pre-mining level, but should reach levels that domestic water wells and springs could be put back into service.

Water level recovery by this mechanism normally occurs within several years after mining.

GROUND WATER QUALITY

The attached water quality data is presented for several wells and springs in the study area. Water quality is generally good for well and springs that tap the aquifers above the mine.

Water quality for water encountered in the mine is also attached. This water quality mirrors water quality obtained from domestic wells in the area.

Therefore, any effect on water quality from the mining activity would be negligible.

(5) Describe the plan for collection, recording, and reporting of surface and ground water quality and quantity data in accordance with paragraph (M)(2)(1)(c) of rule 1501:13-9-04 of the Administrative Code.

See Addendum to Part 3, Page 24, E(5)

(6) In addition to the information required by item (D) (12) of this Part, describe, including appropriate drawings, any permanent entry seals and downslope barriers designed to ensure stability under anticipated hydraulic heads developed while promoting mine inundation after mine closure.

There will be no permanent entry seals nor downslope barriers at the Powhatan No. 6 Mine.

F. DIVERSIONS

(1) Will the proposed coal mining activities result in diversions of overland flow away from the disturbed areas? _____ Yes, __X__ No. If "yes", describe, including maps and cross sections, the diversion to be constructed to achieve compliance with paragraph (D) of rule 1501:13-9-04.

(2) Will the proposed coal mining activities result in the diversion of intermittent or perennial streams within the proposed permit area? _____ Yes, __X__ No. If "yes", describe, including maps and cross sections, the diversions to be constructed to achieve compliance with paragraph (E) of rule 1501:13-9-04 of the Administrative Code.

G. PROTECTION OF PUBLIC PARKS AND HISTORIC PLACES

(1) May the proposed coal mining activities adversely affect any public parks or historic places? _____ Yes, __X__ No.

(2) If "yes" to Item G(1), describe the measures to be used to minimize or prevent these impacts.

ADDENDUM TO PAGE 24, E(5)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

Ground water and surface water monitoring as previously proposed for Powhatan No. 6 Mine will continue with respect to the surface operations. Ground water and surface water monitoring over full recovery areas of the underground operations is proposed to determine the impacts of underground mining on these areas. The proposed plan presented below is to be used in lieu of all previously proposed and existing plans for such areas.

Intermittent and perennial streams originating within the full recovery areas will be monitored where the stream leaves such areas; and the streams crossing through full recovery areas will be monitored both upstream and downstream of the panel.

Ground water monitoring will consist of sampling all developed water sources, with the permission of the landowner, in the following manner:

1. Monthly monitoring will be done for quantity (static water level and flow).

2. Quarterly monitoring will be conducted for quality and quantity for a one year period; such monitoring to have been completed prior to full recovery mining.

3. Weekly monitoring for flow and static water level will be conducted when the longwall face approaches within four hundred and fifty feet (450') or within three weeks of undermining, whichever is less, and will continue until the longwall face moves past the developed water source by four hundred and fifty feet (450') or three weeks, whichever is less.

4. Quarterly monitoring for quantity and quality will be conducted in areas for a minimum of one year after full recovery mining. At that time, a joint decision between OVCC and DOR will be made on the need for additional monitoring.

5. Daily precipitation data from the mining area will be submitted to evaluate spring and streamflow.

With each quarterly monitoring report of ground water and surface water, a map depicting the progression of the longwall faces will be attached to indicate the sampling points in the full recovery areas. Stations within four hundred and fifty feet (450') either direction from the longwall face are denoted as "mining" at the top of the page. Footnotes will indicate the position of the station relative to the longwall face with a "+" indicating station is in advance of the face and a "-" indicating a position behind the face.

An attempt will be made to sample as outlined above, however, some sources may not be accessible should a landowner deny permission to sample. These locations, if encountered, will be documented in the quarterly reports.

All samples will be taken as outlined to the extent that existing well construction allows. Any samples that are unobtainable will be documented as such in the quarterly report. Note: Quality sampling will include analyses for nitrates beginning in November, 1989.

OVCC will monitor all developed supplies in accordance with the monitoring plan outlined above regardless of the aquifers and/or saturated zones that they access. All developed supplies have been identified and have been indicated on the Application Map.

BELMONT COUNTY
SANITARY SEWER DISTRICT

P. O. BOX 457
ST. CLAIRSVILLE, OHIO 43950
Phone: 695-3144

June 9, 1989

Dave Bartsch
Ohio Valley Coal
56854 Pleasant Ridge Road
Alledonia, Ohio 43902

Dear Mr. Bartsch:

As per our phone conversation concerning the Belmont County Sanitary Sewer District water supply between Centerville and Armstrong Mills, we have a 6" water line along State Route 9 which could supply the necessary water for ten (10) families. We do not have a line on Oglebay Road.

Therefore, your company would be responsible to construct a water line at your expense and our specifications to serve the families in that area.

If you have additional questions, please give me a call.

Sincerely,

David Grum
Director

DG:jm

(d) If protection of the quantity of surface and ground water can not be assured, describe alternative sources of water that can be developed.

See Addendum to Part 3, Page 22, E (1)(a, b, c, d)

(2) Describe the plan for the control of surface water drainage into, through, and out of the proposed permit area.

(3) Describe the plan for the treatment of surface and ground water drainage from the area to be disturbed by the proposed coal mining activities.

(4) List the quantitative limits on pollutants in discharges subject to paragraph (B) of rule 1501:13-9-04 of the Administrative Code.

H. MINING NEAR OR THROUGH A PUBLIC ROAD

If the response to item D(6) in Part 1 of the permit application is "yes", describe the measures to be used to ensure that the interests of the public and landowners are protected.

I. SUBSIDENCE CONTROL SURVEY

(1) List all structures which exist within the proposed permit and adjacent areas.

See Addendum to Page 25, I

Note: No structures protected pursuant to 1501:13-12-03(E) exist within the proposed mine plan area.

(2) List all renewable resource lands which exist within the proposed permit and adjacent areas.

See Addendum to Page 25, I

(3) Identify those structures which could be materially damaged as a result of subsidence.

See Addendum to Page 25, I

(4) Identify those renewable resource lands which could suffer diminution of the reasonably forseeable use or value of such lands as a result of subsidence.

See Addendum to Page 25, I

(5) If structures or renewable resource lands exist within the permit or adjacent areas that could be damaged or otherwise adversely affected by subsidence, complete Section (J).

See Section J

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Daniel R. Caretti

TOWNSHIP Smith SECTION 19 COUNTY Belmont

LAND USE Farm Land - Pasture

HYDROLOGIC FEATURE:

Source	Usage
Tributary of Anderson Run	Livestock

GENERAL DESCRIPTION:

Timber Land

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Delmas W. and Mary L. Caretti

TOWNSHIP Smith SECTION 19/20 COUNTY Belmont

LAND USE Residential - Farm Land - Woodland

HYDROLOGIC FEATURE:

Source	Usage
Drilled well - 70' deep Tributary of Anderson Run	Domestic Livestock

GENERAL DESCRIPTION:

Trailer (Rented by Lissa & Joey Parker)
23 head cattle
Barn, miscellaneous shed

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Neal Fankhauser

TOWNSHIP Smith SECTION 19 COUNTY Belmont

LAND USE Residential

HYDROLOGIC FEATURE:

Source	Usage
One drilled well	Domestic
County Water	Domestic

GENERAL DESCRIPTION:

House
Shed

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Royce and Betty Liddle State Route 9

TOWNSHIP Smith SECTION 19 COUNTY Belmont

LAND USE Residential - Pasture

HYDROLOGIC FEATURE:

Source	Usage
House well - 62' deep, pump at 55'	Domestic
County water supply	Domestic
Developed spring	Livestock

GENERAL DESCRIPTION:

House
Garage
Barn

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Royce and Betty Liddle Liddle Road

TOWNSHIP Smith SECTION 19 COUNTY Belmont

LAND USE Pasture

HYDROLOGIC FEATURE:

Source	Usage
Drilled well - hand pump - does not work	
Dug well - pump without power	
Stream	Livestock

GENERAL DESCRIPTION:

House - unoccupied
Barn
Sheds

12/7/89

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER The Ohio Valley Coal Company Ogilbee Road

TOWNSHIP Smith SECTION 26 COUNTY Belmont

LAND USE Residential

HYDROLOGIC FEATURE:

Source	Usage
Drilled well	Domestic

GENERAL DESCRIPTION:

Single family home - rental

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Graydon and Sharon Ooten

TOWNSHIP Smith SECTION 19/20 COUNTY Belmont

LAND USE Residential

HYDROLOGIC FEATURE:

Source	Usage
#1 house well	Domestic

GENERAL DESCRIPTION:

House with attached garage

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER H. R. and D. J. Perkins

TOWNSHIP Smith SECTION 19 COUNTY Belmont

LAND USE Residential - Pasture

HYDROLOGIC FEATURE:

Source	Usage
#1 well hand dug, 78' deep static water 33'	Domestic
Spring	Livestock
County water	Domestic
Stream	Livestock

GENERAL DESCRIPTION:

Farm house
Garage
Barn
Machine shed
Pasture land for dairy cows

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER A and D Riley Armstrong

TOWNSHIP Smith SECTION 19 COUNTY Belmont

LAND USE Residential

HYDROLOGIC FEATURE:

Source	Usage
#1 well	Domestic
#2 well - no pump	
#3 well - no pump	
#4 well - renter house	Domestic

GENERAL DESCRIPTION:

House
Garage
Windmill generator
Rental house

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Harrison Leasing

TOWNSHIP Smith SECTION 20 COUNTY Belmont

LAND USE Undeveloped

HYDROLOGIC FEATURE:

Source	Usage
No developed water sources	
Stream	Unused

GENERAL DESCRIPTION:

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Joseph Gondira

TOWNSHIP Smith SECTION 25 COUNTY Belmont

LAND USE Residential - Some crop farming by adjacent property owner

HYDROLOGIC FEATURE:

Source	Usage
House well - 90' deep 48' static water from top of pump casing	Domestic
Developed spring in back of house	Unused
Cistern at house	Unused
Stream D-6	Unused

GENERAL DESCRIPTION:

Farm house - leased to Elmer Ault
Barn
Shed (garage)

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Anthony and Joanna J. Kolenc Ogilbee Road

TOWNSHIP Smith SECTION 25 COUNTY Belmont

LAND USE Residential - Livestock

HYDROLOGIC FEATURE:

Source	Usage
#1 well - 85' deep pump 50' Tributary to Miller's Run	Domestic Livestock

GENERAL DESCRIPTION:

Trailer
Garage - large metal building
Barn

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Robin Liddle

TOWNSHIP Smith SECTION 25 COUNTY Belmont

LAND USE Undeveloped

HYDROLOGIC FEATURE:

Source	Usage
No developed water sources noted	

GENERAL DESCRIPTION:

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Wayne and Barbara Ogilbee

TOWNSHIP Smith SECTION 25 COUNTY Belmont

LAND USE Residential

HYDROLOGIC FEATURE:

Source	Usage
W. Ogilbee well - 80' deep	Domestic

GENERAL DESCRIPTION:

Newer brick house north end of Ogilbee Road

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Seaway Coal Company

TOWNSHIP Smith/Washington SECTION 25/30/31/32 COUNTY Belmont

LAND USE Undeveloped within area of interest

HYDROLOGIC FEATURE:

Source	Usage
No developed water source within area of interest	

GENERAL DESCRIPTION:

Property lies along trib of Miller's Run

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER N. Sechrest

TOWNSHIP Smith SECTION 25/26 COUNTY Belmont

LAND USE Undeveloped

HYDROLOGIC FEATURE:

Source	Usage
No developed water source within area of interest	

GENERAL DESCRIPTION:

Property lies along Miller's Run

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Robert Shepherd

TOWNSHIP Smith SECTION 25 COUNTY Belmont

LAND USE Timber

HYDROLOGIC FEATURE:

Source	Usage
No developed water sources	

GENERAL DESCRIPTION:

Land lies along Miller's Run

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Donald R. Ward

TOWNSHIP Smith SECTION 25 COUNTY Belmont

LAND USE Undeveloped - House Unoccupied

HYDROLOGIC FEATURE:

Source	Usage
#1 well pump not operable	
Spring in back of house	

GENERAL DESCRIPTION:

House
Garage

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Albert and Mary Ogilbee

TOWNSHIP Smith SECTION 19/25 COUNTY Belmont

LAND USE Residential - Dairy Farm

HYDROLOGIC FEATURE:

Source	Usage
#1 well - hand dug	Domestic
#2 well - 80' deep, drilled	Domestic
#1 pond - behind house	Livestock
#2 pond - north of house	Livestock
One developed spring	Domestic and Livestock
Stream U-6	Livestock

GENERAL DESCRIPTION:

Farm houses
Dairy barns/milk houses
Machine sheds/corn crib
Trailer
Garages
Dairy farm

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Richard and Vernice Otto

TOWNSHIP Smith SECTION 19/20/26 COUNTY Belmont

LAND USE Residential - Dairy Farm

HYDROLOGIC FEATURE:

Source	Usage
#1 well at house dug 40'	Domestic
#1 spring - pump house	Livestock
#2 spring - pasture behind barn	Livestock
County water	
Stream U-4	Livestock

GENERAL DESCRIPTION:

Older brick house - unoccupied
Newer home, occupied
Machine shed, dairy barn, corn crib
Miscellaneous buildings
Dairy farm

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Dexter and Marilyn Blaney

TOWNSHIP Smith/Washington SECTION 25/30 COUNTY Belmont

LAND USE Timber

HYDROLOGIC FEATURE:

Source	Usage
Stream	Unused

GENERAL DESCRIPTION:

Timber lands

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Patricia and Richard Moore

TOWNSHIP Smith/Washington SECTION 19/24 COUNTY Belmont

LAND USE Residential

HYDROLOGIC FEATURE:

Source	Usage
County water supply	Domestic (primary source)
Well #1	Domestic (secondary source)
Well #2	Unused
Well #2 (old Water's house) hand dug	Unused
One developed spring	Pasture, livestock
Misc. undeveloped springs	

All sources outside of Permit area.

GENERAL DESCRIPTION:

Property lies along tributary of Whetstone Creek
Barn
Chicken house
Garage

All structures except barn are outside of hydrologic boundary.
Land and barn only are in hydrologic but outside permit boundary.

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Paul Bobick, Et Al.

TOWNSHIP Smith SECTION 19 COUNTY Belmont

LAND USE Farm Land - Pasture

HYDROLOGIC FEATURE:

Source	Usage
County water supply	Domestic
#1 well - in front of house	Domestic
Cistern from roof, not in use	
One developed spring	Livestock
Pond	Livestock

GENERAL DESCRIPTION:

Farm house West of Route 9
Garage
Barn East of Route 9
Wash house
Pond

ADDENDUM TO PAGE 25, I
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-360-2

SURFACE LANDS INVENTORY

PROPERTY OWNER Eileen Glover

TOWNSHIP Smith SECTION 19 COUNTY Belmont

LAND USE Residential - Pasture used by adjacent property owner

HYDROLOGIC FEATURE:

Source	Usage
House well - covered with concrete slab	Unused
County water	Domestic
Stream	Unused

GENERAL DESCRIPTION:

Two trailers - one unoccupied

J. SUBSIDENCE CONTROL PLAN

(1) Describe the method of coal removal and the size, sequence and timing for the development of underground workings.

Removal is by full recovery methods (e.g. longwall).
See Timing Map for timing, size, and sequence.

(2) For areas above the underground works, indicate the following on the most recent available U.S.G.S. 7.5 min. topographic map:

(a) The extent of the works to be used or developed on a year-by-year basis for the proposed permit term.
See Timing Map

(b) Indicate areas of full recovery (longwall pannels or areas where pillars will be removed).
See Timing Map

(c) Indicate areas in which measures will be taken to prevent or minimize subsidence and subsidence related damage.

N/A

(3) Describe in detail the measures to be taken in the areas indicated in item (2)(c) to prevent or minimize subsidence and subsidence related damage.

N/A

(4) Will monitoring be done to test the effectiveness of the measures described in (3)? _____Yes, _____No.
N/A

(5) Describe the anticipated effects of the planned subsidence including typical extent of vertical and horizontal displacement at the surface.

See Addendum to Part 3, Page 26, J

(6) If adverse effects such as meterial damage to structures or diminution in the value or reasonably forseeable use of renewable resource lands due to planned subsidence are anticipated, describe the measures to be taken to mitigate or remedy such adverse effects.

See Addendum to Part 3, Page 26, J

ADDENDUM TO PART 3, PAGE 26, J
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

ANTICIPATED EFFECTS OF PLANNED SUBSIDENCE

General

The anticipated surface effects of subsidence during and following coal extraction by the longwall method at the Powhatan No. 6 Mine are related to the following movements of the ground surface:

1. Vertical subsidence
2. Horizontal movement

The combination of vertical and horizontal movements of points on the ground surface leads to tensile or extension and compression strains from curvature of the ground surface and tilt. Extension and compression of the ground surface, in the direction of the movement of the longwall face, occur as the face moves in the direction of mining. The extension and compression effects develop after passage of the longwall face. The surface curvature, with resulting extension and compression, and the tilt near the ends of a mined panel and along the sides of a mined panel, represent the permanent effects of subsidence.

Background

The dip of the coal is 19 ft per mile at South 63 Degrees East. The strike is North 27 Degrees East. The panel dimensions are 600 to 800 ft wide and 5,600 to 5,900 ft long. The gates are approximately 200 ft wide between panels. The coal thickness to be extracted is approximately six (6) ft. There is approximately 50 percent of the overburden classified as hard rock.

Time of Subsidence

The surface effects of mining occur at times generally related to the advance of the longwall face.

1. Movements which develop over a panel being mined with passage of the face: these represent the most significant movements and are generally complete within three (3) months of passage of the face.

2. Movements which occur over a previously mined panel as an adjacent panel is mined: such superincumbent movements are relatively small compared to the movements above the panel that is being mined.

3. Movements over a long period of time due to consolidation of the gob and time dependent stress readjustment: long-term subsidence of the ground surface is not expected to be significant.

Predicted Movements

The surface movements indicated below are based on measurements of subsidence effects reported in "Characterizations of Subsidence over Longwall Mining Panels - Eastern Coal Province," by Dames and Moore.[1] The program of measurement was performed over Panels 2, 3, and 4 off 3 North at the Quarto Mining Company, Powhatan No. 4 Mine, during 1981 and 1982 as Panels 3 and 4 were mined. Similar movements, as a result of future mining, are expected at the Powhatan No. 6 Mine.

1. The maximum surface subsidence occurred near the center of the panel being mined and was measured at about 65% of the extracted seam thickness or about 4.7 feet. (Extracted seam thickness was about 7.25 feet.) The maximum angle of draw was about 50 degrees on the panel end, but the average is approximately 30 degrees.

2. An additional surface subsidence of about 10% of the extracted seam thickness (0.7 feet) occurred above Panel No. 3 within the limits of the angle of draw of Panel No. 4 when Panel No. 4 was mined.

3. The maximum tilt measured on the ground surface was about 1.5 degrees, in the direction of face movement.

4. The greatest tensile strain measured on the ground surface was 0.003 inch/inch, and the maximum compressive strain measured was 0.008 inch/inch.

5. Horizontal movements of up to 2 feet were measured.

Effect on Surface Facilities

1. Tension cracking of the ground surface may occur at the sides and ends of a longwall panel. These cracks in the surface may vary in width from hairline, up to 1-1/2 inches wide. In some instances, cracks have been observed to be 6 in. to over 1 ft wide.

2. Structures situated over a panel may be damaged due to subsidence. The damage to be expected may involve cracking of plaster, cracking between concrete block or brick. Cracks in these structures may close after subsidence is complete.

1 "Demonstration of Subsidence Monitoring Systems" Dames & Moore, 1981

3. Underground utility lines (water and gas) may be broken by tensile strains of the magnitudes measured in the DOE study.

4. Poles and towers for electric power lines may tilt due to subsidence. The maximum tilt of 1.5 degrees at the ground surface measured in the DOE study would produce a calculated, horizontal movement of about one (1) foot at a distance of forty (40) feet above the ground surface. Depending on pole spacing and direction of movement, there is a slight risk that wires may be broken. Longwall mining has been conducted in other areas beneath towers, and towers have subsided without complication.

5. Surface slumping may occur due to subsidence where relatively steep slopes with landslide prone soils exist. Some surface slumping was reported during the DOE study previously cited.

6. The effect of the longwall mining on surface water bodies is somewhat unpredictable. Ponds or streams may become partially dry temporarily as a result of subsidence-induced surface cracks.

Remedial Measures

1. In the event that roadway surfaces are damaged by cracks resulting from subsidence due to mining, OVCC, at the request of the applicable regulatory authority, will repair the surface to pre-mining conditions.

2. OVCC will mail written notice to owners and occupants of surface property or structures of OVCC intent to mine under such property or structures at least six months prior to any mining by OVCC under their property. Notwithstanding its mining rights and without waiving nor releasing any of its rights, OVCC will offer to repair or compensate for damages to all structures and facilities caused by OVCC's mining operations. A pre-subsidence survey of all structures to be undermined will be conducted by OVCC personnel and will be used to determine the condition of the structures and facilities prior to the mining. This survey may include, but not be limited to: still and video photography, land surveying, making various measurements, interviewing landowners, tenants, or other individuals, and making various drawings. Refusal of the landowner to allow a pre-subsidence survey will release OVCC from the requirement to conduct the survey. This survey will be performed in accordance with Underground PPD 89-2.

3. Notwithstanding its mining rights and without waiving nor releasing any of its rights, OVCC will offer to repair or pay for repairs for damage caused to surface lands by OVCC's mining operations if the damage reduces the foreseeable use or value of the surface lands. If such damage occurs, OVCC will submit to the Chief within thirty days after the damage occurs:

   a. Site specific plans for the repair or mitigation of the damage, including a time schedule for performance of the remedial action.

   b. A request for more time to prepare such plans; or

   c. Written notification that OVCC believes that repair or restoration measures are not technologically feasible. If repair or restoration measures are not desired by the owner of a structure or if repair or restoration measures are not technologically feasible, other mitigatory measures will be described.

4. Utility companies, which own transmission lines, pipe lines, or other sensitive structures in the permit area, will be notified at least six (6) months prior to any mining under such structures by OVCC. OVCC, subject to its mining rights, will offer to repair such structures.

5. Damage to surface land will be repaired by local contractors. As surface damage occurs, the landowner will be notified and permission to repair the damage will be requested. Surface cracks will usually be repaired by the following method: After the length of the subsidence crack has been determined, a bulldozer will be used to cut a V-shaped trench. The depth of this trench will be approximately 8-10 feet or down to bedrock. During the excavation topsoil will be segregated from subsoil and rock. Upon completion of the excavation, the material will be compacted using the track of the bulldozer. Once the soil material has been replaced, the area will be reclaimed to ODNR specifications.

   OVCC will employ a program to monitor surface cracking and settling resulting from subsidence. Areas being mined will be inspected at various intervals, ranging from daily to weekly. These areas will be visually inspected for any subsidence related problems. If a problem is found, the landowner will be notified immediately.

In most cases, surface cracks are expected to open and close relatively rapidly, however, some surface cracks may take weeks to close. For this reason, most cracks will not be repaired until OVCC determines that the cracks are not going to close themselves. If the surface cracks are in an area that is commonly traveled by man or livestock, the cracks will be repaired immediately. Surface cracking that is found in areas not commonly traveled, may be marked by brightly colored tape. This tape alerts anyone in the area of the depression or opening. If the cracks do not close within the period of time OVCC determines is adequate, a contractor will repair the cracks.

Monitoring of these areas will continue for up to six months after mining, and if the cracks reopen, they will once again be repaired. Monitoring of panel areas before mining consists of visual inspection or aerial photo review. These areas are being inspected before mining, due to the water monitoring program which starts one year prior to mining.

OVCC's subsidence program will adequately assure that the value and reasonably foreseeable use of the surface land is maintained.

6. The Ogilbee dairy farm is located directly over a longwall panel. The dairy barn and milk house will experience subsidence of approximately 2 ft from its original elevation. Some surface and structural damage is anticipated. The magnitude of this damage is directly related to the extraction rate. If the rate is slow, more severe damage (such as concrete cracking, differential settlement of corners, etc.) will occur. In some cases, it has been observed that one end of a structure will be in tension while other parts are stationary as the subsidence wave moves through the structure. In fact, all structures experience a series of tension/compression strains that causes some damage. It is the intention of OVCC to remove the coal under all structures, including the dairy barn and milk house on the Ogilbee (and other) dairy farm(s) as rapidly as possible to minimize damage.

   In the case of the Ogilbee barn and milk house, they are located over the center of the panel and are not expected to receive significant horizontal or tensile forces normally associated with panel edges. Some damage, as described above, is anticipated and will be repaired as described below.

Prior to undermining the dairy structures, most particularly, the barn/milk house, OVCC will prepare the structure at OVCC's expense as follows:

A. A water supply line from the new County water line will be installed prior to mining in order to provide water on a continuous basis. This water line will be installed in such a manner that subsidence will not interrupt the flow of water.

B. The electrical supply to the barn/milk house will be inspected and, if necessary, changed to permit the downward movement of the structure.

C. The framework structure of the barn will be inspected to determine its ability to withstand the forces caused by subsidence. Weak members will be reinforced (with materials of similar construction if practical). Temporary reinforcement measures will be used where practical in order to return the barn to pre-mining conditions after mining is complete.

D. The milking system will be inspected to determine its ability to withstand the forces caused by subsidence. Rigidly held lines will be fastened with flexible couplings to permit movement of the barn and still permit the normal flow of milk to the bulk tank. All modifications will comply with State and County Health Department guidelines.

E. The bulk milk tank will be placed on a low-profile platform that permits easy, ongoing leveling. The tank will be re-certified after this change is made at the expense of OVCC. The platform will be arranged to maintain adequate clearance over the tank.

F. The compressors and coolant lines for the bulk tank will be inspected and retrofitted with flexible connections to permit the downward movement of the structure.

During mining under the barn/milk house, OVCC will provide the following services at OVCC's expense:

A. The barn/milk house will be inspected at least 2 hours prior to milking for damage that may impede normal milking operations. Minor repairs will be made to insure that the milking processes will occur normally. Specifically, the barn and related facilities (e.g., stanchions) will be maintained in

a usable condition. Milk lines will be inspected for breakage and flow direction and any repairs will be made prior to milking. Compressors and refrigerant lines will be inspected and repairs will be made if necessary. The bulk tank will be re-leveled and re-certified prior to pick-up of the milk at OVCC's expense. The integrity of both the water and the electrical systems will be inspected and repaired prior to milking. Sufficient numbers of personnel qualified to do the inspection and repair work will be present before the milking begins. During milking, any necessary repairs will be made to allow the milking process to continue.

B. Following the milking, any additional repairs to the facilities not needed for milking will be completed. The requirements of the County and State Health Service Departments for a Grade A dairy farm will be maintained during subsidence at OVCC's expense, including the repair of doors, the barn floor, the barn cleaner, and the water system. If the barn cleaner cannot be maintained in operation, manual labor will be used to keep the barn clean.

C. Prior to the introduction of farm equipment into fields that have been undermined, OVCC will inspect the field for cracks or slips. Repairs needed (to maintain access into the fields) will be made at appropriate times. Crop lands damaged by subsidence will be repaired at appropriate times to permit harvest or cultivation without damage to personnel or equipment. Lost or damaged crops will be replaced in kind by OVCC at OVCC's expense. Note: "appropriate times" indicates that the repairs will be made 1) at a time when access is needed and 2) when damage to adjacent plants will be minimized. In any case, crop production will be maintained during and after mining. OVCC believes that there will be no effect on the crop production as a result of mining. This fact is supported by a paper written by Dr. Frank L. Himes, Ph.D., entitled "Agronomic Evaluation of the Land in the Southern Ohio Coal Company Area," June 1983. A copy is included in this addendum.

After mining, all structures on the farm will be repaired or replaced as required. OVCC will make use of identical materials to make repairs. All structures will be returned to their pre-mining condition in all ways, including color, construction, and composition. Structures damaged beyond repair will be replaced with identical construction.

Affected water supplies will be subject to the provisions found in the Addendum to Part 2, Page 14F. In the long term, permanent water supplies will consist of re-drilled wells, re-developed springs, new or repaired cisterns, re-dug ponds, or with county water. If county water is used, a single, lump sum cash amount will be deposited in the Ogilbee's bank. The sum shall be sufficient to provide enough interest to pay for the cost of county water. The lump sum will belong to the Ogilbee's when deposited in the bank. A combination of these provisions may be required.

It is estimated that the dairy farm uses 5500 gallons of water per month for each of the three families that reside there. Also, the 110 cows (70 now, 40 additional planned for next year) and 258 hogs consume approximately 204,000 gallons of water per month. During phone conversations with the Belmont County Sanitary Sewer District Director, he indicated that this demand, plus the additional demand from farms and residences on Ogilbee Road, could easily be met from the County water system. The Director also indicated that even in any previous severe drought situation, Belmont County has never denied water to any farmer.

It is the intent of OVCC to offer landowners equitable options as outlined above in order to restore the reasonable foreseeable use of the land and facilities.

AGRONOMIC EVALUATION OF LAND

IN THE

SOUTHERN OHIO COAL COMPANY AREA

AMERICAN ELECTRIC POWER
SERVICE CORPORATION

JUNE, 1983

FRANK L. HIMES, Ph.D.
Professor of Agronomy
Ohio State University

INTRODUCTION

Areas considered typical of different surface effects of the Meigs County Mine #2 were observed on May 26, 1983. Mr. Keith Peluchette assisted me in reading the detailed mining map in respect to surface locations and data of mining. The dates of mining varied from three (3) years to present.

OBSERVATIONS

The areas of observation made by walking, included a small corn field (fallow this year) and the adjacent woods, an orchard, and a meadow area near a road. Additional areas were observed by driving around the area.

1. Subsidence with associated cracking did not result in mixing of soil layers except possibly for some sloughing at the cracks.

2. The trees in the subsided areas did not show damage when compared to those in the areas that had not been subsided.

3. After the cracks close in the later stages of subsidence, they are difficult to locate in densely vegetated meadows and woods.

DISCUSSION

1. No evidence was obtained that the subsidence would alter soil management practices. Since the soil horizons (topsoil, subsoil, and parent material) have the same respective locations, the chemical properties of the soil have not been changed. Therefore, fertilizer and liming recommendations would not change with subsidence. After any cracks have closed, the same equipment could be used on both the subsided and the non-subsided areas. The surface slopes were not altered appreciably in respect to equipment use.

2. Although no sloughing was observed on the cracks, common sense would indicate that plant residues and a little topsoil would enter any such cracks. The extent of sloughing would depend upon the surface conditions and activities. The coating of the surface of the cracks with the surface "debris" would produce a plane of weakness. By this is meant, during very dry periods when the soil contracts, shrinkage cracks would be along these faces. Also, plant roots would grow more extensively in the remnant of the crack than in the adjacent zone because the fertility and aeration are better. Plant roots

are not drill bits and penetrate the soil only by entering pores (or voids) that are larger than the root.

As indicated on the map included, the Monongahela soils (and likewise for the Latham soils) have a compact layer at 20 to 30 inches that impedes root penetration and percolation of water. The fracturing of this layer and partial filling with debris would increase the rooting depth of and available water to the plants growing within a few inches of the crack. In some areas of Ohio, farmers subsoil their land which is a practice to fracture the dense layers 15 to 24 inches below the surface. The practice called vertical mulching is more effective because plant residues are incorporated. It improves both root penetration and the infiltration and percolation of water. In most instances, the additional infiltration results in less runoff and less erosion.

Erosion is a natural hazard for the Gilpin, Dekalb, Latham, Monongahela, and Upshur soils. These soils usually occur on slopes exceeding six (6) percent. Therefore, practices or occurrences that decrease the amount of water runoff will decrease erosion. Because these soils are rated highly erosive (see map

and Table 1), farming practices should be selected for erosion control to hold erosion to a minimum. Although no waterways were observed, if subsidence caused a shift in a waterway, the farmer would need to make minor changes in his tillage practices.

3. Tables 2, 3, and 4 summarize other properties of the soils and the type of agriculture in Meigs County. The productivity of these soils is often limited by fairly acid subsoils, low fertility, shallow (less than 36 inches) rooting, low moisture holding capacity, and steep slopes. The soil management practices needed to make these soils productive do not change with subsidence. Although a detailed soil survey of the area is not available, a generalized map and publications containing additional information about these soils are included.

CONCLUSION

The fertility of the soils was not altered by subsidence except within cracks if sloughing occurred. The fracturing of layers that restrict water movement and root penetration should be beneficial to the plants growing near the fractures. The maintenance of the farmer's erosion control waterways may have to be adjusted accordingly if subsidence were to change the flow in them.

The soils in this area are difficult to maintain on a high state of productivity, and subsidence has little impact on the chemical and physical properties of the soils. Based on practices in other areas of the world, the fracturing of the layers inhibiting root development will be beneficial to plant growth. The agronomic uses of the soils are not influenced by longwalling.

TABLE 1[1]

Soil Series	K*
Dekalb	0.24
Gilpin	0.32
Latham	0.43
Monongahela	0.43
Upshur	0.43

*K is the soil erodibility factor. The highest value for Ohio soils is 0.49 and most are below 0.40.

[1]"Ohio Erosion Control and Sediment Pollution Abatement Guide." Bulletin 594, Cooperative Extension Service, The Ohio State University.

TABLE 2

Meigs County - Soil and Water Conservation Needs - 1967

Total Land Area	277,610 A
Non-Inventory Acreage (Urban, etc.)	13,058 A
Inventory Acreage	264,552 A
Cropland[2]	48,263 A
Pasture[2]	41,251 A
Forest[2]	168,100 A
Other Land[2]	6,938 A

IRRIGATED AND NON-IRRIGATED CROPLAND BY LAND CAPABILITY CLASSES, 1967[3]

LAND CAPABILITY CLASS SUB-CLASS	TILLAGE ROTATION: ALL ROW CROPS	FIELD CROPS CLOSE GROWN	ROTATION HAY AND PASTURE	HAY-LAND	CONSER-VATION USE ONLY	TEMPORAR-ILY IDLE CROPLAND	ORCHARDS VINEYARDS AND BUSH FRUITS	TOTAL CROPLAND
1	867	434	2842	908	864	1246	0	7161
2E	1127	217	1516	909	2013	1091	0	6873
3E	1084	651	1326	2181	2589	623	160	8614
4E	2212	217	2463	2181	576	1246	0	8895
6E	1864	217	2652	3635	575	312	0	9255
2W	867	1301	1894	182	290	779	0	5313
3W	434	217	757	0	0	0	0	1408
7S	0	0	380	364	0	0	0	744
TOTAL	8455	3254	13830	10360	6907	5297	160	48263

PASTURE, FOREST, AND OTHER LAND ACRES
BY LAND CAPABILITY CLASSES, 1967[4]

LAND CAPABILITY CLASS SUB-CLASS	PASTURE & RANGE			FOREST			
	PASTURE	COMMER-CIAL	NON-COMMER-CIAL	COMMER-CIAL GRAZED	IN FARMS	NOT IN FARMS	TOTAL LAND IN INVENTORY
1	2633	5433	0	217	867	0	16094
2E	1229	1654	0	0	651	0	10407
3E	4740	5433	0	867	867	0	19654
4E	8601	25042	200	7156	217	0	42955
6E	13692	49612	0	9541	867	0	73426
7E	4213	11341	0	1735	217	0	15771
2W	1404	1181	0	217	0	0	7898
3W	351	945	0	0	0	0	2704
6S	175	2[illegible]7	0	0	0	0	412
7S	4213	66622	200	9107	1084	1301	74164
8S	0	0	200	0	0	867	1067
TOTAL	41251	167500	600	28840	4770	2168	264552

Ohio Soil and Water Conservation Needs Inventory, Sponsored by USDA, 1971.

1. Page 12
2. Page 14
3. Page 29
4. Page 48

TABLE 3

MEIGS COUNTY - AGRICULTURAL STATISTICS

	1980	1981
Number of Farms[1]	620	610
Average Size of Farm[1]	177 A	182 A
Land in Farms[1]	110,000 A	111,000 A
Corn for Grain[2]	3,700 A	5,200 A
Yield[2]	130 bu./A	85 bu./A
Soybeans[3]	(Less than 1,000 A)	
Wheat[4]	(Less than 1,000 A)	
Oats[5]	(Less than 1,000 A)	
Hay (all)[6]	16,800 A	15,800 A
Yield[6]	2.2 T/A	2.2 T/A
All Cattle and Milk Cows[7]	13,000	14,000
Hogs and Pigs[8]	2,000	1,900
Stock Sheep[8]	(Less than 1,000)	
Hens and Pullets, Laying Age[8]	30,000	30,000

Published by Ohio Co-op Reporting Service, June 1981-1982, Ohio Agricultural Statistics.

1. Page 7
2. Page 9
3. Page 11
4. Page 13
5. Page 15
6. Page 17
7. Page 37
8. Page 43

TABLE 4

Available Moisture Capacity for the Surface Layer[1]

Dekalb Soil	0.13-0.17 in./in. of soil
Gilpin Soil	0.17-0.22 in./in. of soil
Latham Soil	0.18-0.22 in./in. of soil
Upshur Soil	0.18-0.22 in./in. of soil

[1]Soil Survey of Monroe County, Ohio. Published by USDA, 1974, pp. 39-43.

Frank L. Himes: Professor, Department of Agronomy, The Ohio State University, 1885 Neil Avenue, Columbus, Ohio 43210.
Phone: (614)422-2002

Date of Birth: July 30, 1927. Place of Birth: Crawfordsville, Indiana.

Education:

A.B. Wabash College (Chemistry), 1949.
M.Sc. Purdue University (Organic Chemistry), 1951.
Massachusetts Institute of Technology (Westinghouse Science Teacher Institute), Summer 1952.
Ph.D. Purdue University (Soil Fertility and Chemistry), 1956.

Professional and Technical Societies:

American Society of Agronomy, Soil Science Society of America, International Soil Science Society, American Chemical Society, Sigma Xi, Gamma Sigma Delta.

Professional Experience:

1949-1951	Teaching Assistant, Department of Chemistry, Purdue University.
1951-1953	High School Science Teacher, Remington High School, Remington, Indiana.
1953-1955	Fellowship, Department of Agronomy, Purdue University.
1955-1957	Assistant Professor in the Departments of Agriculture and Chemistry, Middle Tennessee State University, Murfreesboro, Tennessee.
1957-present	Assistant Professor, Associate Professor, Professor, Department of Agronomy, Ohio State University.

Publications:

Books written

Himes, F. L. 1969. Audio Tutorial Notes for Soils, 1st ed. Bugess Publishing Co.

Himes, F. L. 1972. ibid, 2nd ed.

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Himes, F. L. 1979. ibid, 4th ed.

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Himes, F. L. 1974. Inventorying Soil Resources. Chapter 28 of "Man's Finite Earth", R. O. Utgard and C. D. McKenzie, eds.

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Himes, F. L. and S. A. Barber. 1957. Chelating ability of soil organic matter. Soil Sci. Soc. Amer. Proc. 21:368-373.

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Himes, F. L. and R. Shufeldt. 1969. Influence of Some Organic Compounds on the Movement of Sr^{90} in Soils. Proc. of Internat. Symposium on Radioecology, Cadarache, France.

Street, J. R., P. R. Henderlong and F. L. Himes. 1974. The Silica Content of Merion Kentucky Bluegrass Under Several Cultural Regimes and Its Relation to Thatch Accumulation. Turf and Landscape Research. OARDC Res. Sum 79. Sept. pp 9-12.

Street, J. R., P. R. Henderlong and F. L. Himes. 1977. Influence of silica on chemical composition and decomposition of turfgrass tissue. Proceed. III International Turfgrass Res. Conf. Chapt. 38, pp. 329-336.

Lueking, M. A., J. W. Johnson, and F. L. Himes. 1983. Effects of Increasing the Rates of Potassium and Nitrapyrin on Nitrogen Uptake by Corn. Agron. J. 75:247-249.

Non-Technical Papers

Himes, F. L. 1963. Careers in Agronomy. The Ohio Farmer.

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Himes, F. L. 1976. Use of the Overhead Projector to Illustrate Ion Exchange Reactions. J. of Agron. Educ. 5:33-34.

ADDENDUM TO PAGE 26, J(2)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

ANNUAL MAP

A mine map will be submitted every six months to coincide with the permit anniversary date. For ground water monitoring, the face location of the active panel will be provided quarterly with the monitoring data. The maps will contain the following:

1. Scale the same as the Division of Mines submittal, or 1 in.= 500 ft.
2. All base map requirements pursuant to ORC 4153.03.
3. Extraction ratios for completed sections.
4. Coal elevations.
5. Surface structures.
6. Locations of subsidence and water monitoring stations.
7. Mine height (extraction thickness).
8. Completion/abandonment dates for completed sections.

ADDENDUM TO PAGE 26, J(6)
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
R-0360-2

During our pre-subsidence survey, if landslide prone areas are discovered that would significantly affect the dwelling or useable land areas, these will be recorded. If subsidence due to mining operations causes material damage or reduces the value or reasonably foreseeable use of the surface land, OVCC will restore the land to a condition capable of supporting uses it was capable of supporting before subsidence. If landslides are triggered by mining activities, these areas would be stabilized in accordance with accepted site specific procedures for such work if technologically and economically feasible. If not feasible, OVCC will arrange alternative mitigatory measures.

A search of the *Belmont County Soils Maps (specifically No. 52, No. 53, No. 60, and No. 61) revealed approximately 22 potential slide/slip areas within the following soil types:

Type	Slope	No. of Potential Slide/Slip Areas
Lowell Westmoreland Loams (LoD, LoE, LoC, LpF)	8%-70%	15
Richland Loam (RcD)	15%-25%	1
Westmoreland Silt Loam (WmC)	8%-25%	1
Lowell Silt Loam (LoF, LeD, LeB, LeC)	3%-70%	5

During the pre-subsidence survey, these areas, as well as other similar sites that may have a significant impact to existing structures, will be reviewed. Should conditions dictate, site specific measures, not limited to but including installation of cut-off trenches, drainage systems, and retaining walls, may be taken to minimize adverse affects.

* Soil Survey of Belmont County
ODNR, USDA March, 1974

SAMPLE OF LANDOWNER NOTIFICATION LETTER

Dear

Please be advised that The Ohio Valley Coal Company plans to conduct underground coal mining operations beneath your property and/or structures in Section , Township, Belmont County, Ohio. These operations are presently scheduled to take place during the half of . This date is subject to change in accordance with revisions to the mining plan of The Ohio Valley Coal Company.

According to the present mining plan, the coal beneath your property and/or structures will be mined utilizing the longwall mining method, from which we do expect subsidence of the surface. All property owners will be contacted prior to subsidence, and owners of surface structures will be contacted concerning subsidence damage to such structures.

Enclosed you will find a map showing the longwall panel in relation to your surface lands and other adjacent property owners.

The Ohio Valley Coal Company has made available for public inspection a copy of the subsidence control plan for the Powhatan No. 6 Mine at The Ohio Valley Coal Company office on State Route 148 near Alledonia, Ohio. If you desire to review the subsidence control plan, please contact David Bartsch at (614) 926-1351 or (614) 695-2882.

Very truly yours,

THE OHIO VALLEY COAL COMPANY

Part 5 - Format and Content

A. Filing of Addendums

If addendums are needed to present the information required by the items in the permit application, the addendum is to be submitted with the permit application and each page, map, plan or other document in the addendum should include the applicant's name and indicate to what item the addendum applies. For example, "Addendum to Part 3, Item K(2) Zebco Coal Company.

B. Provide the information requested below for all technical data submitted in the application

Identification of Technical Data (1)	Name of Person/ Organization which Collected Data	Date Data Collected	Methodology Used Collecting Data	Name of Person/ Organization Which Analyzed Data	Date Data Analyzed	Methodology used to Analyze Data
Addendum No. 5 Hydrologic Determination	Moody & Associates, Inc. RD 4, Cotton Road Meadville, PA 16335		Burt Waite	Burt Waite		

(1) The technical data is to be identified by referencing the particular item in the application for which the data was used in preparing the response. e.g. Part 2, B(1); Attachment 14; Part 4, A.

C. Provide the name, address ans position of officials of each private or academic research organization or governmental agency contacted in the preparation of the application for information on land uses, soils, geology, vegetation, fish and wildlife, water quality and quantity, air quality, and archeological, cultural, and historic features.

Name of Official	Address of Official	Position of Official	Name of Agency/ Organization	Type of Information e.g. Geology
Dan Dudley	OEPA Division of Water Quality Monitoring and Assessment P.O. Box 1049 Columbus, Ohio 43266		OEPA	Hydrologic Measurements and Analysis

The maximum area of influence from subsidence will be 30 degrees measured out from the permit boundary. (SEE ZERO SUBSIDENCE LINE)

TOTAL ACREAGE - COAL ACREAGE - 470 ACRES

Note: Entire permit area is for full coal recovery methods

LOCATION MAP

32 26 20 14
31 29 13
WASHINGTON TWP.
36 30 24 18
35 29 23 17

SCALE 1" = 1 MI.

ARROTOWN HILLS QUADRANGLE MAP

APPLICATION AREA

LEGEND

FENCE LINE
TREE LINE
Occupied Dwelling
SUBSURFACE OWNER of Rights & Coal (C)
Unoccupied Dwelling
SURFACE OWNER (S)
Utility Line
Core Hole
Gas/Oil Well
INTERMITTENT STREAM
Perennial Stream
PROPERTY LINE
Water Treatment Facility
Public Water Line
Stream Sampling Station UPSTREAM DOWNSTREAM
Drilled Well
Dug Well
Developed Spring
Undeveloped Spring
Monitoring Station

NOTES:

Watershed: Dogline Creek
USGS Quadrangle: Armstrong Mills
Application Area
Permit Area
Contour Line

CERTIFICATION

I, the undersigned, hereby certify that this map is correct and shows to the best of my knowledge and belief, all the information required by Chapter 1513 of the Revised Code and the rules thereunder.

DAVID R. BARTLETT E-50880 REGISTERED PROFESSIONAL ENGINEER

Signature

Acknowledged before me, a Notary Public, this 5th day of Dec., in the year 1989

Claude Louis Luke, Notary Public, State of Ohio
My commission expires August 24, 1991

STATE OF OHIO NOTARY PUBLIC CLAUDE LOUIS LUKE My Commission Expires Aug. 24, 1991

APPLICATION MAP - SHADOW AREA MAP/HYDROLOGY

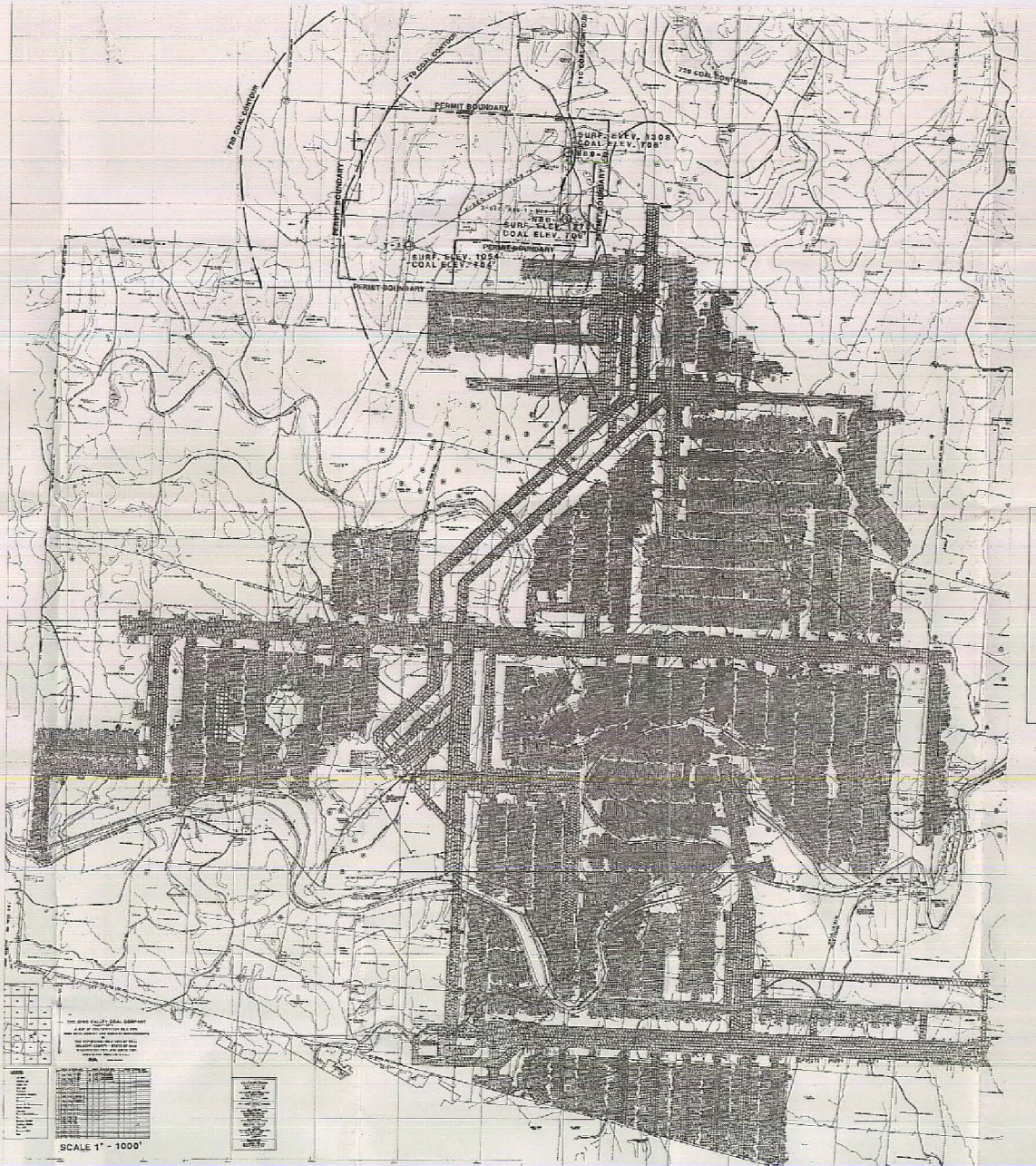
THE OHIO VALLEY COAL COMPANY
56854 Pleasant Ridge Road, Alledonia, Ohio 43902
BELMONT COUNTY, SMITH TOWNSHIP, SECTIONS 19, 25
TOWNSHIP 6 RANGE 4
SCALE 1"=200' DATE: 6/14/1989
PERMIT NO. D-0060 APPLICATION NO. R-0360-2
MAP NO. OV-LW-89-1

OPERATOR

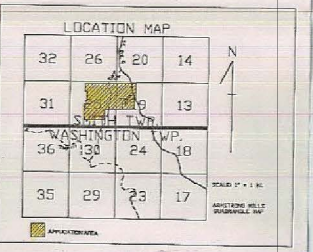
RO360-2

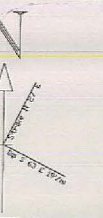
10000 20726


HYDROLOGIC BOUNDARY
PERMIT BOUNDARY
State Rt. 9
TWP 116
TWP 117
PERMIT BOUNDARY
STATE RT. 9
HYDROLOGIC BOUNDARY
LOCATION MAP
32
26
20
14
31
13
SMITH TWP.
WASHINGTON TWP.
36
30
24
18
35
29
23
17
N
APPLICATION AREA
N
S 10° E 1320'
S 80° E 660'
LEGEND
Occupied Dwelling
Unoccupied Dwelling
FENCE LINE
Water Line
TREE LINE
Core Hole
Gas/Oil Well
Perennial Stream
Water Treatment Facility
Public Water Line
Stream Sampling Station
Drilled Well
Dug Well
Developed Spring
Undeveloped Spring
Monitoring Station
NOTES:
Watershed: Captina Creek
USGS Quadrangle: Armstrong Mills
Application Area
Permit Area
Contour Line: 710 COAL CONTOUR
DEC 07 1989
APPLICATION
I, the undersigned, hereby certify that
the information herein is correct, and known to the best of
my knowledge and belief, all the information
required by Chapter 1513 of the Revised Code
of Ohio and rules adopted thereunder.
Subscribed before me, a Notary Public, this
day of Dec. in the year 1989
Claude Louis Long, Notary Public
State of Ohio
My commission expires August 20, 1991
APPLICATION MAP - TOPOGRAPHY
THE OHIO VALLEY COAL COMPANY
56854 Pleasant Ridge Road, Alledonia, Ohio 43902
BELMONT COUNTY SMITH TOWNSHIP SECTIONS 19, 25
TOWNSHIP 6 RANGE 4
SCALE 1"=200' CONTOUR IS' DATE: 6/14/1989
PERMIT NO. D-0360 APPLICATION NO. R-0360-2
MAP NO. OV-LW-89-R
OPERATOR
R0360-2



LOCATION MAP





LEGEND

- Occupied Dwelling
- Unoccupied Dwelling
- Utility Line
- Core Hole
- Gas/Oil Well
- Perennial Stream
- Water Treatment Facility
- Public Water Line
- Stream Sampling Station
- Drilled Well
- Dug Well
- Developed Spring
- Undeveloped Spring
- Monitoring Station

NOTES:

- Watershed: Captina Creek
- USGS Quadrangle: Armstrong Mills
- Application Area:
- Permit Area:
- Contour Line:

CERTIFICATION

I, the undersigned, hereby certify that I have read the foregoing and above to the best of my knowledge and belief, all the information required by Chapter 1513 of the Revised Code and Rules thereunder.

David L. Painter

Subscribed before me, a Notary Public, this 21st day of Dec., in the year 1989.

Claude Louis Lane, Notary Public
State of Ohio
My commission expires August 28, 1994

APPLICATION MAP
STRUCTURAL CONTOURS AND BOREHOLES
THE OHIO VALLEY COAL COMPANY
56854 Pleasant Ridge Road, Alledonia, Ohio 43902
BELMONT COUNTY SMITH TOWNSHIP SECTIONS 19, 25
TOWNSHIP 6 RANGE 4
SCALE: 1"=1000' CONTOURS 10' DATE: 6/14/1989
PERMIT NO. 7-0360 APPLICATION NO. R-0360-2
MAP NO. OV-1,W-93-3

OPERATOR

V276 P162 #86 OVCC

V276 P161 #51-1 OVCC

OVCC V276 P162 #51-2

V388 P536 #47-4 OVCC

OVCC V388 P541 #46

OVCC V276 P161 #52-1

V276 P161 #52-2 OVCC

V276 P182 #10 OVCC

25

OVCC #82 V521 P523

OVCC V276 P158 #44

19

V276 P160 #83 OVCC

PERMIT BOUNDARY

V276 P159 #82 OVCC

V276 P157 #42 OVCC

OVCC V276 P159 #82

OVCC V276 P159 #82

DEC 01 1989

V276 P159 #82 OVCC

SMITH TOWNSHIP

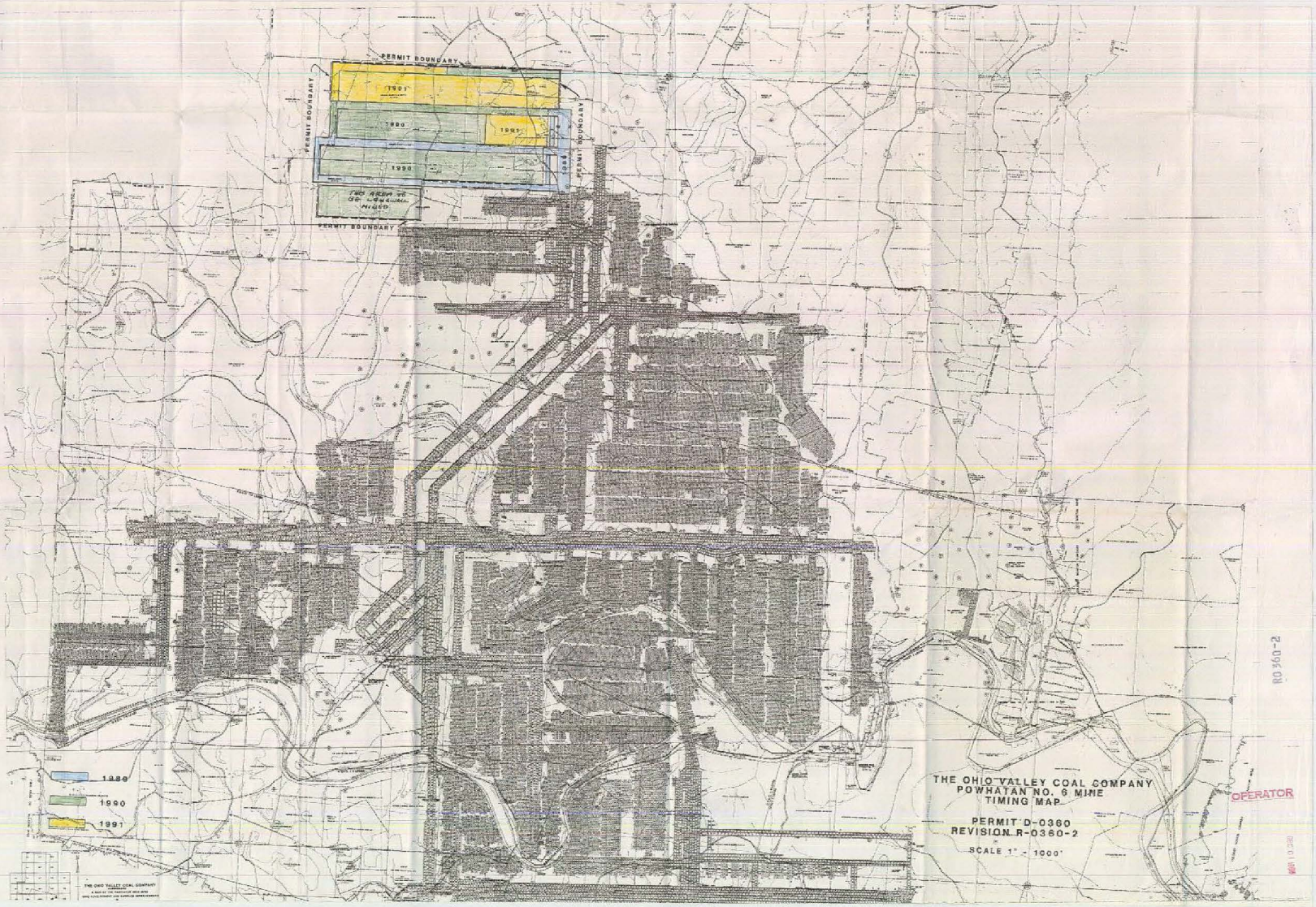
WASHINGTON TOWNSHIP

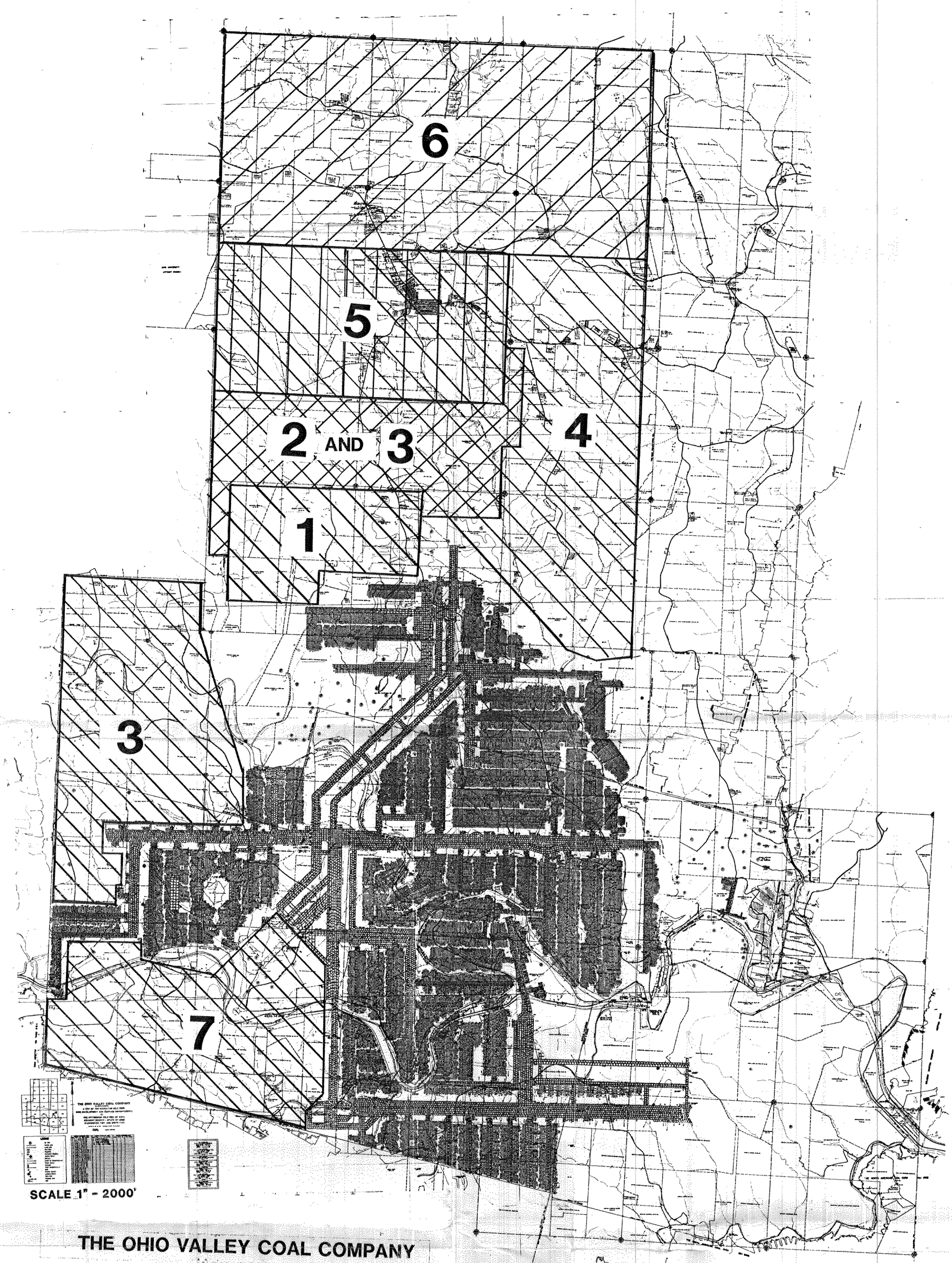
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT D-0360 ARP NO. R-360-2
COAL PARCEL MAP
SCALE: 1" - 200'

OPERATOR

R0360-2

TOVCC 20779

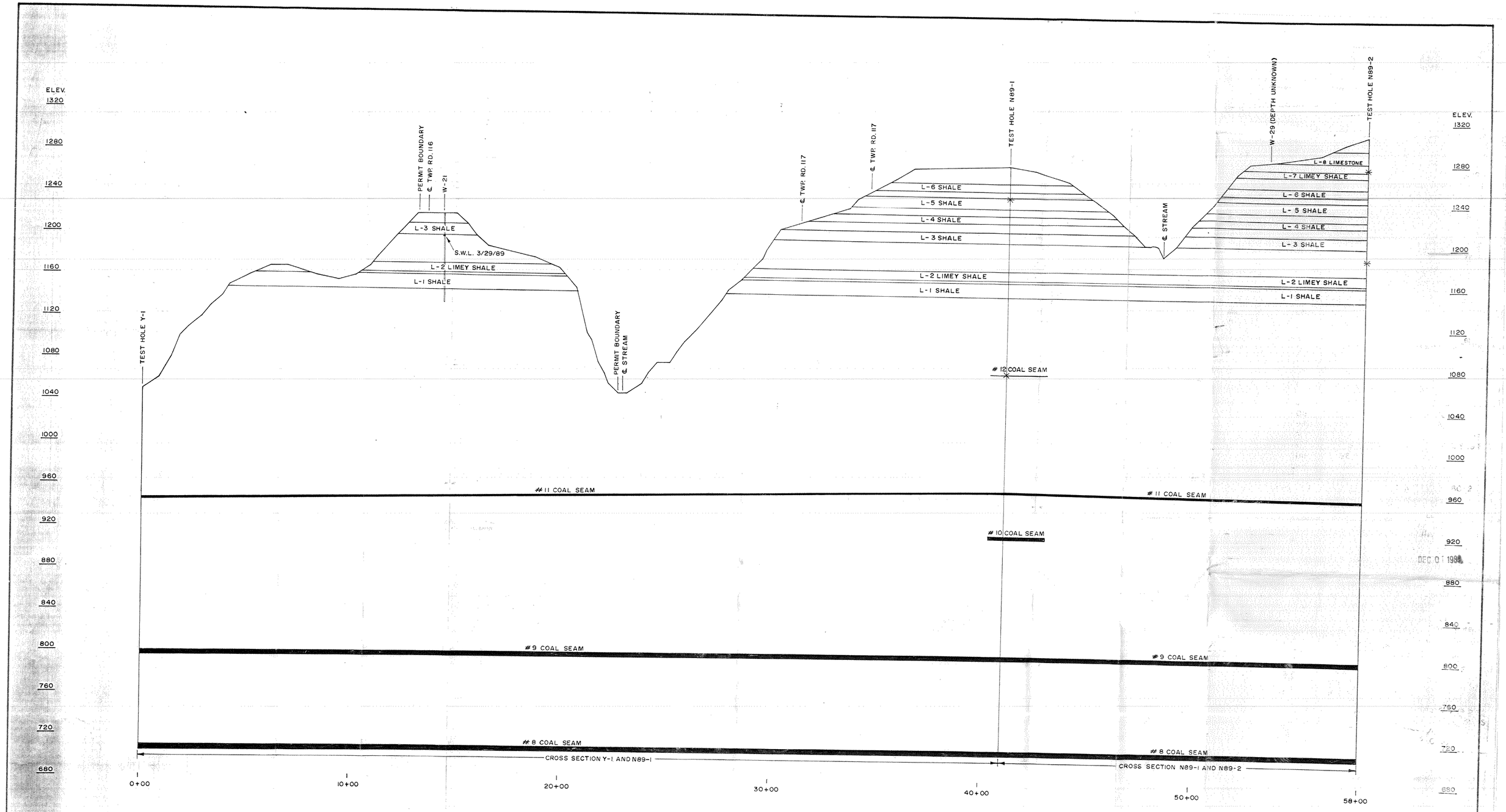

PERMIT BOUNDARY
1991
1990
1990
1991
1990
THIS AREA TO BE MINED
PERMIT BOUNDARY
PERMIT BOUNDARY
PERMIT BOUNDARY
1990
1991
THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
TIMING MAP
PERMIT D-0360
REVISION R-0360-2
SCALE 1" = 1000'
OPERATOR
RD 360-2



THE OHIO VALLEY COAL COMPANY
POWHATAN NO. 6 MINE
PERMIT NO. D-0360
PROPOSED FUTURE PERMIT SEQUENCING

Addendum to Part 1, Page 6, A (18)

EXCEPTED - WILL NOT BE PERMITTED



OPERATOR

NOTES

1. SEE ATTACHMENT 13 FOR A DETAILED LIST OF THE LITHOLOGIES AND THICKNESS ENCOUNTERED DURING DRILLING.
2. AQUIFER ZONES L-1 THROUGH L-8 ARE THE SATURATED ZONES IDENTIFIED ON THE ATTACHMENT 14B's.
3. * DENOTES WATER ENCOUNTERED DURING DRILLING.

LITHOLOGIC AND HYDROLOGIC CROSS SECTION
THE OHIO VALLEY COAL COMPANY
56854 PLEASANT RIDGE ROAD, ALLEDONIA, OHIO 43902
BELMONT COUNTY, SMITH TOWNSHIP, SECTIONS 19 & 25 & 24
TOWNSHIP 6 RANGE 4
HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1"=40'
PERMIT NO. D-0360 APPLICATION NO. R-0360-2
DATE: 11-7-89
PREPARED BY: HAMILTON SURVEYING
P.O. BOX 471, EAST HIGH STREET
FLUSHING, OHIO 43977
COMM. # 489-3

RO 360-2